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About This Manual

Audience

This manual supports the field service maintenance and repair of the HDI® 5000 Ultrasound System. The user of this document is a qualified ultrasound electronics technician who has completed training classes on the system and its peripherals.

Manual Format

This manual is in Portable Document Format (PDF), for viewing on a laptop-computer with Acrobat Reader. A list of bookmarks functions as an additional table of contents. Those bookmarks, the table of contents, and cross-references use hypertext links to provide access to the referenced information.

Conventions in This Manual

The following conventions are used in this manual:

- Hypertext links are blue.
- All procedures are numbered. You must complete steps in the sequence they are presented to ensure reliable results.
- Bulleted lists indicate general information about a function or procedure. They do not imply a sequential procedure.
- Control names and menu items or titles are spelled as they are on the system, and they appear in bold text.
- Symbols appear as they appear on the system.
- An English system is assumed.

Service Manual Questions or Comments

If you have questions about the service manual, or you discover an error in the manual, contact Philips Ultrasound Technical Publications:

- atl-bothell.techpubs@philips.com
- Technical Publications, MS 964, at the address below

Customer Assistance

Various support locations around the world can provide customers technical assistance with the ultrasound system. Customers should contact the representative or sales office from which they purchased the system or the nearest Philips Ultrasound office.

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1 General Information

Introduction

The HDI 5000 Ultrasound System is a general-purpose, mobile, software-controlled, diagnostic ultrasound system. Its function is to acquire, process, and display ultrasound data (Figure 1-1).

The operator can measure anatomical structures and generate reports for health care professionals. The primary users are physicians and sonographers in clinics and hospital departments that provide diagnostic ultrasound services.

The system has a basic set of imaging modes and measurement tools. There also are modes and measurement tools which are only available when a specific mode or analysis package is purchased and enabled for customer use. Upgrade security is controlled through the use of system-specific passwords and software.

Refer to Section 4, “Theory of Operation”, for front-end theory and Section 6, “Performance Tests”, for operating parameters.

Figure 1-1 HDI 5000 Ultrasound Systems

HDI 5000 system (classic)

Philips HDI 5000 system

Scanheads

Refer to Section 13, “Scanheads”, for a list of the scanheads.

Physical Description

Frame

The frame provides the primary structural support for the system. It has a one-piece weldment. Front casters are swivel mounted with brake locks. Rear casters are fixed or swivel mounted depending on when the system was manufactured. Casters have integral shock mounts. The frame provides the mounting base and swivel mechanism for the monitor module.

Card Cage

The removable card cage slides into the frame and is secured with screws. It incorporates a center motherboard, or centerplane, with modules inserted from the front and rear. The card cage is designed to allow for future motherboard, power supply, and fan module upgrades. Rear mounted fans provide forced air cooling.

Eight slots are dedicated with appropriate shielding for channel boards. Two additional shielded slots are available for the AIM+ PCB and a spare PCB. External connections are provided through connectors mounted on brackets attached directly to the card cage modules to eliminate cabling to remote connectors. All power supplies, disk drives, and PCBs are slide-in modules with card-edge connectors, switches, and LEDs, as necessary.

Peripherals

For the classic HDI 5000, peripherals are installed into the cart with their control panels accessible to the operator. Some peripheral controls also are available on the system control panel for various OEM functions.

The open peripheral bay will accept a variety of peripherals. Peripherals are mounted by one or more straps on a universal adapter plate. The plate can easily be modified or replaced to accommodate future peripherals. A VCR mounts on top of the monitor or in the OEM bay.

For the Philips HDI 5000, OEMs are mounted on an OEM platform on the rear of the command module. The same OEM controls are located on the control panel as with the classic HDI 5000 system. The open peripheral bay also accommodates peripherals similar to the classic HDI 5000 system.

Control Panels

Operator controls consist of a full-size keyboard, a trackball and an array of pushbuttons, toggle switches, slidepots, and rotary controls. Pressing certain switches displays menus on the video screen. The trackball is then used to select from the menus. Slidepots control TGC. Rotary controls are used for gain control.

Included on the control module assembly are scanhead holders, storage trays at the rear, and the handle used to move the system. The keyboard wrist rest also serves as an ESD ground for the operator.

Monitor

The monitor assembly includes a single 15-inch, 120-Vac, 50/60-Hz non-interlaced all-digital monitor, monitor enclosure, and mounting for the VCR. The VCR and monitor are removable for mobile systems.Video resolution is 512 x 640 pixels in NTSC format and 512 x 768 pixels in PAL format.

The monitor senses the input video format and will also display interlaced video with horizontal sync frequencies, nominally 15 kHz, with vertical sync signal frequencies of 25 Hz and 30 Hz.

The monitor also accepts progressive video with horizontal sync frequencies, nominally 31 kHz, with vertical sync signal frequencies between 50 Hz and 60 Hz.

For the classic HDI 5000 system, the monitor is mounted on a swivel base that is mounted on the frame. For the Philips HDI 5000 system, the monitor is mounted on an articulating arm that allows it to move left or right, to move forward and backward, and to rotate and tilt.

Cables

Internal power cables are routed from the AC Input Module (ACIM) through the right rear of the system (with the observer facing the rear of the system) to the OEM or module requiring power. Internal signal cables are routed from the Internal Interface Module (IIM) through the left rear of the system to each OEM or the monitor. Refer to Section 10, “Cabling”, for more information.

Supplies and Accessories

System-specific and general-purpose ultrasound supplies and accessories, including scanhead biopsy guides, are available from CIVCO Medical Instruments at the addresses and numbers below. Supplies and accessories are no longer available from Philips Ultrasound.

CIVCO Medical Instruments
102 First St. South
Kalona, IA 52247-9589

Phone:	(800) 445-6741, Ex. 1 for Customer Service (USA)
	(319) 656-4447 (International)
Fax:	(877) 329-2482 (USA)
	(319) 656-4451 (International)
E-mail:	info@civcomedical.com
Internet:	www.civco.com

2 Specifications

Physical Dimensions

Classic HDI 5000

- Width: 72 cm (28.35 in)
- Height: 157.5 cm (62 in) with VCR
  142 cm (56 in) without VCR
  122 cm (48 in) when monitor is removed for transport
- Depth: 110.4 cm (43.45 in)
- Weight: 172-200 kg (380-440 lb) (depends upon system configuration)

Philips HDI 5000

- Width: 73.4 cm (28.9 in)
- Height: 146.1 cm (57.5 in)
- Depth: 111.8 cm (44.0 in)
- Weight: 190.5-226.8 kg (420-500 lb), depends upon system configuration

System Architecture

- Digital broadband beamformer
- Extended signal processing
- Modular microcomputer structure

Imaging Modes

- Gray-scale 2D
- Color 2D
- M-mode

- Color M-Mode
- Doppler (PW and CW)
- Broadband Flow Imaging
- Contrast Specific Imaging
- Tissue Harmonic Imaging (THI)
- Color Power Angio® Imaging
- Tissue Doppler Imaging (TDI)
- Advanced 3D Imaging
- 3D Color Power Angio (3D CPA)
- 3D Grayscale
- Panoramic Imaging
- Power Motion™ Imaging (PMI)
- SonoCT® Real-time Compound Imaging

Update Methods

- Update or Duplex
- Triple Mode
- Simultaneous

Clinical Options

- Abdominal
- Abdominal Surgery
- Adult Cardiology
- Advanced Breast Imaging
- Cardiology Contrast Specific Imaging (CSI)

- Cerebrovascular
- General Imaging CSI
- Generic
- Gynecological and Fertility
- Musculoskeletal
- Neurosurgery
- Obstetrical
- Pediatric/Fetal Cardiology
- Pediatric General Imaging
- Peripheral Vascular
- Prostate
- Small Parts
- Transesophageal Cardiology
- Transcranial Doppler
- Vascular Surgery

Gain

- Slidepot controls for TGC (b/w, color, and TDI)
- 2D gain rotary control
- Doppler gain rotary control
- Color gain rotary control

Gray Shades	• 256 in 2D • 64 in M-mode • 256 in Doppler
Image Processing	• 2D graymaps • 3D CPA and grayscale displays • Chroma® maps • Doppler graymaps • Dynamic range • Color maps • CPA maps • CPA blending • CPA display type • Dynamic Motion Differentiation • XRes™ Visualization Technology
Scan Conversion	• Sector for phased and curved array scanheads • Rectangular for linear array scanheads, steered for Color and Doppler imaging
Frame Rate	Greater than 500 frames/sec (dependent on field-of-view, depth, and angle)
User Control System	• Monitor brightness, contrast, lightbar, focus, and background color controls (default settings) • Rotary controls • Slidepot controls

- Keyboard
- Volume control
- Dedicated primary imaging controls
- Menus and superkeys for secondary imaging controls
- Color and tint controls for VCR playback
- Softkeys
- Digital Video Streaming (DVS™) hand controller
- Footswitch

Digital Signal Processing

- Selectable compression (dynamic range)
- Automatic system bandwidth adjustment
- Selectable receive bandwidth patient optimization
- Software-controlled bandwidth, filter, and frequency optimization
- SonoCT Real-time Compound Imaging
- Intelligent Frame Rate Accelerator (multi-line processing)
- XRes Visualization Technology

Image Modification

- Zoom and pan of real-time or frozen 2D image
- Up to eight times magnification of 2D images
- High Definition™ Zoom
- Up to five times M-mode zoom
- 2D persistence
- Color persistence

- Color capture
- Color tag
- Color smoothing
- TDI Blend

Programmability

- Application and scanhead optimization
- Optimization for 3D, harmonic imaging, frame rate, and 2D/Color imaging
- Quick Save of user settings by application and scanhead
- On-screen programming for internal and external hardcopy devices
- User-defined acquisition protocols with the DVS option
- Analysis configuration
- Annotation text

Display Annotation

- Patient name and identification
- Institution
- Time and date
- Biopsy guide line
- Title, text, arrows, scanhead position, and body marker annotation
- Tissue specific body markers
- Additional Image Information
- Image Management status
- TI and MI values
- M cursor

- Doppler sample volume and angle correction
- Graphics control with the DVS option

Image Presentation

- Up/down orientation
- Left/right orientation

2D

- Image orientation marker
- Application-specific selectable graymaps
- 2D gain control
- Up to 5 transmit focal zones
- 2D persistence
- Dynamic range (compression curves)
- Chroma maps (gray-scale colorization)
- 2D sector size and steering
- Zoom
- HD Zoom
- 2D PRF control
- SonoCT Real-time Compound Imaging (Survey and Target modes)
- XRes Visualization Technology
- iSCAN Intelligent Optimization

3D

- Calibrated with position sensor and workstation
- Uncalibrated
- Cardiology with the MPT7-4 scanhead

M-Mode

- Four sweep speeds
- Time markers
- M-mode review
- M-mode zoom
- Three display sizes

Doppler

- Digital wall filters (25–1600 Hz)
- Pulsed wave (PRF range: 1.25–22.7 kHz)
- Continuous wave (Sample rate: 1.50–41.7 kHz)
- High PRF
- Adjustable sample volume (1.5–20 mm)
- Adjustable zero baseline
- Normal or inverted display
- Three display sizes
- Four sweep speeds
- Doppler gain control
- Doppler review
- Doppler graymaps
- Low flow capability

- Equivalent 5-MHz annotation
- High Q® Automatic Doppler Results Display
- Angle correction
- Tissue Doppler Imaging for PW Doppler
- iSCAN Intelligent Optimization

Color and Tissue Doppler Imaging

- 2D Color/Tissue Doppler Imaging
- M-Mode Color
- Color gain control
- Selectable color maps
- Velocity, variance, and power displays
- Dynamic Motion Differentiation (DMD)
- Sensitivity
- Priority threshold
- Line density
- Color persistence
- Color smoothing
- Color tag
- Color capture
- Blending
- Frequency or velocity units
- Tissue Doppler Imaging for Color 2D and M-mode

Power and Power Motion Imaging

- 2D Color Power Angio Imaging/Power Motion Imaging
- 3D Color Power Angio Imaging
- Power Motion Imaging
- Selectable maps
- Dynamic Motion Differentiation
- Adjustable background (on or off)
- Display (Topography)
- Background (Blend)
- Dynamic Range
- Persistence
- Sensitivity
- Line Density

Physio

- ECG
- High-Level ECG
- Pulse
- Phono
- Auxiliary

Table 2-1 Physio ECG Performance Characteristics

Characteristic	Specification
Lower Frequency Cut-off	0.65 Hz ± 0.06 Hz
Upper Frequency Cut-off	> 30 Hz ± 3.0 Hz
Nominal Input Amplitude	1 mVp-p
Minimum Sensitivity	5×10^{-3} V

Table 2-2 Physio High Level ECG Performance Characteristics

Characteristic	Specification
Lower Frequency Cut-off	0.0 Hz ± 0.1 Hz
Upper Frequency Cut-off	> 32 Hz ± 3.2 Hz
Gain Range	21 dB ± 1 dB
Minimum Sensitivity	2×10^{-2} V

Table 2-3 Physio Pulse Performance Characteristics

	Specifications	
Characteristic	**Fukuda Denshi**	**Other**
Lower Frequency Cut-off	0.5 Hz ± 0.1 Hz	0.5 Hz ± 0.1 Hz
Upper Frequency Cut-off	> 50 Hz	> 50 Hz
Gain Range	45 dB ± 1 dB	35.5 dB ± 1 dB
Minimum Sensitivity	50 X 10^{-6} V	2 X 10^{-3} V

Table 2-4 Physio Auxiliary Performance Characteristics

Characteristic	**Specification**
Lower Frequency Cut-off	0.5 Hz ± 0.1 Hz
Upper Frequency Cut-off	> 800 Hz
Gain Range	28.5 dB ± 1 dB
Minimum Sensitivity	5 X 10^{-3} V

Table 2-5 Physio Phono Performance Characteristics

			Gain Range		Minimum Sensitivity	
Phono Filter	Low Frequency Cut-off	Upper Frequency Cut-off	Fukuda Denshi	Other	Fukuda Denshi	Other
Off	28 ± 2.8 Hz	810 ± 81 Hz	51 ± 1 dB	56 ± 1dB	50 X 10^{-6} V	50 X 10^{-6} V
Low	78 ± 7.8 Hz	385 ± 38.5 Hz	51 ± 1 dB	56 ± 1dB	15 X 10^{-6} V	15 X 10^{-6} V
Medium	90 ± 9.0 Hz	620 ± 62 Hz	51 ± 1 dB	56 ± 1dB	15 X 10^{-6} V	15 X 10^{-6} V
High	180 ± 18 Hz	800 ± 80 Hz	51 ± 1 dB	56 ± 1dB	10 X 10^{-6} V	10 X 10^{-6} V

Triggering Modes

- Single (A or B channel)
- Dual (simultaneous A and B channels)
- Timer (A channel only, capture initiated by system clock)

Calculations

- General Imaging
- Cardiology
- Analysis (calcs) Configuration (Power Calcs)

Measurement Tools

- Distance
- Curved distance
- Area
- Time/slope

- Volume
- Volume Flow
- Cardiac Output
- Heart rate
- High Q set region
- High Q mean trace
- High Q peak trace
- Calibration
- Optional hip angle
- Optional d:D ratio
- Optional% diameter reduction
- Optional% area reduction
- Qualitative Wall Motion scoring
- Assisted Border Detection (ABD), requires DVS option

Image Storage and Retrieval

- Cineloop® Image Review, 2D
- Cineloop Image Review, 3D
- Doppler Review
- M-mode Review
- Image Management Option, DEFF-compatible, and for systems with the DVS option, DICOM-compatible
- VCR Playback and Frame Grab
- Digital Video Streaming (DVS) Option

Table 2-6 DiskLink Features and Specifications

Parameter	Specification
Image size (NTSC/PAL)	308 KB/455 KB black-and-white 917 KB/1330 KB color
MO drive capacity	640 MB (drive size will be smaller on older systems)
MO disk size/maximum number of images stored per disk	128 MB/415 black-and-white or 140 color images (NTSC) 128 MB/281 black-and-white or 96 color images (PAL) 230 MB/745 black-and-white or 250 color images (NTSC) 230 MB/504 black-and-white or 172 color images (PAL) 540 MB/1750 black-and-white or 585 color images (NTSC) 540 MB/1180 black-and-white or 403 color images (PAL)
Maximum number of patients on MO	As limited by disk space
Maximum number of images per patient on MO	As limited by disk space
Image storage on hard drive	2.1 GB
Maximum number of patients on hard drive	150 at approximately 7.5 MB per patient
Maximum number of images/patients on hard drive	100
File formats	DEFF on MO Proprietary format on hard drive
Image types	Black and white Color Duplex

Table 2-6 DiskLink Features and Specifications (Continued)

Parameter	Specification
Print destination options	Black and White or All to Black and White printer Color or All to Color printer
Image output formats	1, 2, 6, 12, 15 images per page (black-and-white or color)
Capture mode	Single frame on MO Single and multi-frames on hard drive

Serial Data Transfer

- 9600 baud
- 8 data bits
- No parity
- One stop-bit
- Xon-Xoff protocol

Optional Hardcopy Devices

- Super VHS VCR
- Multi-Image camera
- Color page printer
- Report printer
- Black-and-white page printer

External Connections

- RGB-S (Red, Green, Blue, and Sync) video 50/60 Hz frame rate, non-interlaced for external video monitors: Sub-D 9-pin connector

- RGB-S-CB (Red, Green, Blue, Sync, and Composite Blanking) video 25/30-Hz frame rate, interlaced for external hardcopy devices: Sub-D 15-pin connector (input and output connector)
- Composite gray scale for external hardcopy output: BNC connector
- VCR-S Video input/output: 9-pin DSUB connector
- VCR composite video output: BNC connector
- VCR composite input: BNC connector
- VCR audio output (left/right): dual RCA jacks
- VCR audio input (left/right): dual RCA jacks
- External line printer output, RS-232A: D-sub 9-pin connector
- System diagnostic and network I/O (Ethernet), USD port RS-232A: D-sub 9-pin connector (disconnect cable for systems with DVS option)

Electrical and Video Parameters

NOTE Refer to Table 5-3 for input voltage specifications.

- 100Vac, (V~), at 50 Hz or 60 Hz, 1450 VA
- 120Vac, (V~), at 60 Hz, 1450 VA
- 220-240 Vac, (V~), at 50 Hz, 1450 VA
- 220-240 Vac, (V~), at 60 Hz, 1450 VA
- Integral AC line conditioner
- Power consumption: 800 watts; with optional OEMs, 1150 watts

Monitor

- One 15-inch, high-resolution, color monitor
- Provides a tilt and swivel adjustment

- Adjustable contrast, brightness, and lightbar controls
- Audio speakers
- Safety latches
- Microphone connector

Languages - System Software

- English
- French
- German
- Italian

Languages - User Interface Assemblies (Control Panels)

- English, upper and lower
- French, upper and lower
- German, upper and lower
- Italian, upper and lower
- Danish, lower (use English upper)
- Norwegian, lower (use English upper)
- Swedish/Finnish, lower (use English upper)

Storage

- Unified cable management system
- Gel bottle
- Footswitch
- Two general purpose trays

Temperature, Pressure, and Humidity Limits

- Storage and Shipping
  - High: 65° C (150° F), Low: -35° C (-31° F)
  - All at 1060 hPa to 303 hPa (1.05 ATM to 0.3 ATM)
  - 15% to 95% relative humidity
- Operating Environment
  - High: 40° C Low: 10° C:
  - All at 1060 hPa to 700 hPa (1.05 ATM to 0.7 ATM)
  - 15% to 95% relative humidity

Patient Data Security

Password-protected access to images on the hard drive

Safety Requirements

- Classification:
  - Class I with Type B, BF, and CF applied parts
  - Ordinary Equipment
  - Non-AP/APG
- Electromechanical safety standards met:
  - CSA C22.2 No. 601.1, Canadian Standards Association, Medical Electrical Equipment
  - EN 60601-1, Second Edition, including Amendments 1 and 2, European Norm, Medical Electrical Equipment
  - EN 60601-1-2, First Edition, European Norm, Collateral Standard Electromagnetic Compatibility

  - IEC 1157:1992, International Electrotechnical Commission, Requirements for the declaration of acoustic output of medical diagnostic ultrasonic equipment
  - JIS T-1000 Series, Japanese Industrial Standard, Medical Electrical Equipment
  - UL 2601-1, Underwriters Laboratories, Medical Electrical Equipment
- Agency approvals:
  - Canadian Standards Association (CSA)
  - Japanese Ministry of Health and Welfare (pending)
  - ISO 9001, EN46001 Quality Assurance Standard; Certificate #FM28256 issued by the British Standards Institution (BSI) for Quality Systems
  - CE Marked to the European Community Medical Device Directive 93/42/EEC per Annex II, as a Class IIa device, in accordance with Annex IX (BSI Certificate #0604)

Philips Ultrasound reserves the right to change specifications contained herein or discontinue manufacture at any time without prior notice. Current specifications are supplied with each system.

3 Safety

Introduction

Please read this information before using the ultrasound system. It applies to the ultrasound system, scanheads, recording devices, and any optional equipment.

This device is intended for use by, or by the order of, and under the supervision of a licensed physician qualified to direct the use of the device.

In this manual, a **WARNING** describes precautions necessary to prevent injury or loss of life.

In this manual, a **CAUTION** describes precautions necessary to protect the equipment.

Electrical Safety

This equipment has been Certified by a recognized third-party testing agency as a Class I device with Type B non-isolated and Type BF and Type CF isolated patient-applied parts. For maximum safety observe these warnings:

WARNINGS

- Before connecting and applying power, all ACIM (power input panel) mounting screws must be in place and properly secured to complete the system ground path.
- Shock hazards may exist if this system is not properly grounded. Protection against electrical shock is provided by grounding the chassis with a 3-wire cable and plug. The system must be plugged into a hospital-grade three-hole outlet. The grounding wire must not be removed or defeated.
- Do not remove the protective covers on the system; hazardous voltages are present inside. Cabinet panels must be in place while the system is in use. All internal adjustments and replacements must be made by a qualified customer support representative.

WARNINGS

- Do not operate this system in the presence of flammable gases or anesthetics. Explosion can result.
- Always inspect the scanhead or pencil probe face, housing, and cable before use. Do not use the scanhead or pencil probe if the face is cracked, chipped, or torn, the housing is damaged, or the cable is abraded.
- Always disconnect the system from the wall outlet before cleaning the system.
- Connection of optional devices not supplied by Philips Ultrasound could result in electrical shock. When such optional devices are connected to your ultrasound system, ensure the total system chassis risk current does not exceed 100 µA for 120-Vac systems and 500 µA for 230-Vac systems.
- In general, only the area of the scanhead acoustic window is watertight. Except where specified in specific scanhead cleaning instructions, do not immerse the remainder of a scanhead in any liquid.

CAUTIONS

- Always place the system ON/STANDBY switch to STANDBY for five to ten seconds before setting the system I/O circuit breaker to OFF.
- If you intend to power-down and then power-up a system, always wait five to ten seconds after placing the ON/STANDBY switch to STANDBY before placing the switch to ON. A power-down sequence, similar to the initialization that occurs when power is first turned on, saves certain operating parameters and turns off power supplies in a sequential order. Review the power subsystem discussion in “Theory of Operation” on page 62.

CAUTIONS

- Always verify the power cord voltage label matches the voltage on the device before plugging in the power cord. On 230-Volt systems VCR power is 230 Volts but the monitor is 120 Volts. Applying 230 Volts to the monitor will destroy it.
- This equipment contains components that are electrostatic sensitive. Proper static procedures, protection, and equipment must be used prior to opening and during handling of this equipment. Failure to use ESD procedures will cause damage to these components. Such damage to components is not covered by Philips Ultrasound warranties.

Mechanical Safety

WARNINGS

- Be aware of the casters, especially when moving the system. The system can weigh 200 kg (440 pounds), depending upon configuration, and it could cause injury to you or others if it rolls over feet or into shins.
- Push the system, instead of pulling it, and use special caution when going up or down ramps.
- Position external hardcopy devices away from the system. Ensure they are secure. Do not stack them on the system.

CAUTIONS

- Ensure the scanhead cables are secure. Use the cable management system to ensure the scanhead cables are protected from damage.
- Electrostatic discharge (ESD) can amount to a significant voltage, which may cause damage to PCBs or other system components. The following precautions can reduce ESD: anti-static spray on carpets; anti-static spray on linoleum; anti-static mats; use of a ground wire connection between the system and the patient table or bed; and use of the ESD pads on the system handles and the wrist support of the system keyboard.

Equipment Protection

CAUTIONS

- Excessive bending or twisting of a scanhead or pencil probe cable may cause failure or intermittent operation of the system.
- Do not sterilize a scanhead using gas or heat methods. Never autoclave a scanhead or expose it to temperatures exceeding 55° C (131° F). These sterilization methods may permanently damage the scanhead. For disinfection and sterilization instructions, see the *Using Disinfectants and Gels* manual, part number 4700-0249-XX.
- Inspect the system power cord and plug on a regular basis. Ensure they are not damaged in any way.
- The power supplies continue to operate when the system is in standby. Ensure the circuit breaker is off before unplugging the system from the wall outlet.

CAUTIONS

- The power supplies continue to operate when the system is in standby. Ensure the circuit breaker is off before unplugging the system from the wall outlet.
- For optimal performance, the ultrasound system should be connected to a 15-Ampere dedicated circuit with an isolated ground for 100V/120V systems, or a 7.5-Ampere dedicated circuit with an isolated ground for 220V/240V systems.

Safety Symbol Definitions

The International Electrotechnical Commission (IEC) has established a set of symbols to classify electrical connections and warn of potential hazards on medical electronic equipment.

The following symbols are used on the outside of the system

	Grounded patient connection. Protection against electrical shock is provided by connection of chassis to the safety ground.
	Isolated patient connection.
	Isolated patient connection for applied parts in direct contact with major vessels. (Type CF)
	I and O on the circuit breaker represent ON and OFF.
	This symbol on the power switch represents ON and STANDBY.

	This symbol identifies a safety note. Ensure you understand the function of this control before using it. Refer to the appropriate section in the Reference Manual for an explanation of the control.
IPX-1	Drip-proof appliance on scanhead, pencil probe, or footswitch. This instrument may be safely handled in a damp environment.
IPX-7	Water-proof appliance (scanheads only). This instrument may be safely immersed.
	Identifies equipotential ground (located next to ground stud on the rear panel).

The following symbols are used inside the system

	Identifies high-voltage components operating above 750 Vac (RMS) or 750 Vdc.
	Identifies the point where the system safety ground is fastened to the chassis.

Save these instructions.

4 Theory of Operation

Introduction

This section describes the electronics of the system and how the echo data flows through it. Also included are descriptions of the control architecture, software architecture, and the packaging.

Operating System

The software operating system is supported by X-Windows software. X-Windows is an industry-standard software system that allows the development of graphical user interfaces, which consist of windows, graphics, and displayed text.

X-Windows is made up of a server and a client. The server resides on the Pixel Conversion Module (PCM), and the client resides on the Central Processing Unit (CPU).

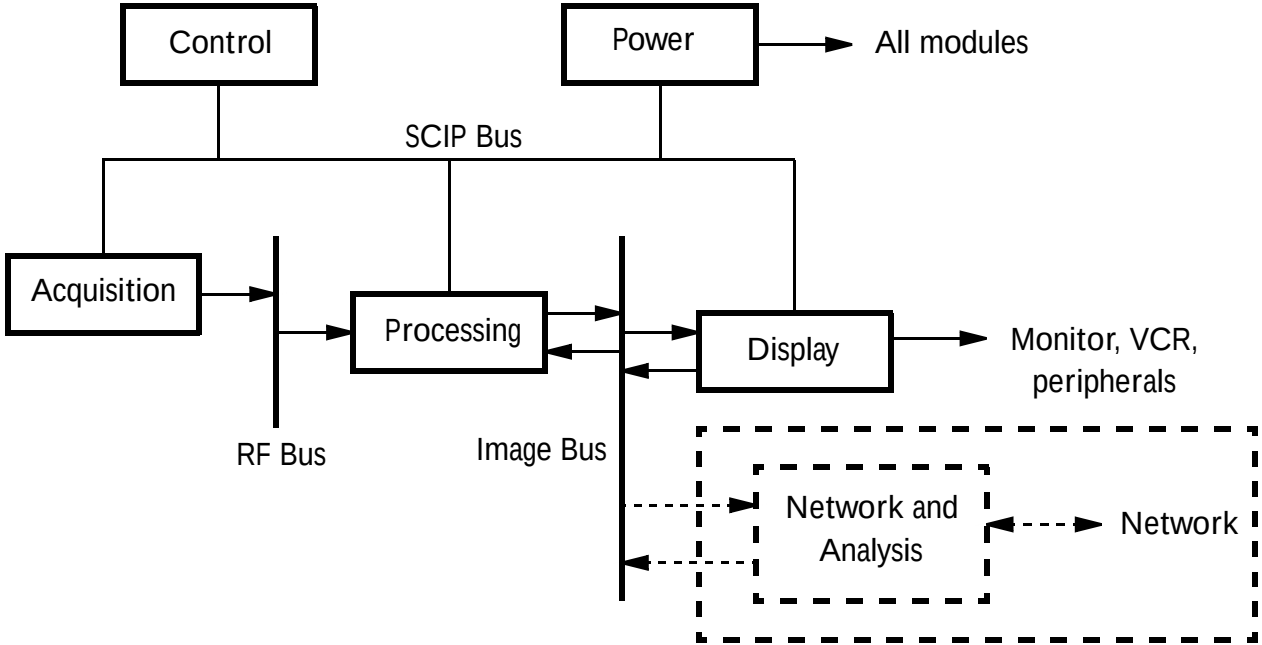
- The server completely controls all input and output devices
- The client communicates with the server using Ethernet, an asynchronous byte-stream protocol
- CPU software controls all ultrasound functions

Subsystems

The electronics of the system can be divided into five basic functional subsystems (Figure 4-1). Each subsystem contains several modules that perform specific functions within the subsystem:

- Power Subsystem
- Control Subsystem
- Acquisition Subsystem
- Processing Subsystem
- Display Subsystem

Figure 4-1 System Block Diagram



Power Subsystem

The Power Subsystem (Figure 4-2) includes AC Input Module (ACIM) and Power Supply Module (PSM). The power subsystem is monitored by the Front End Controller (FEC) using the Front End Processor (FEP) bus.

System power is not field-configurable. Four versions of the ACIM provide 100-120 Vac/60 Hz, 100-120 Vac/50 Hz, 240 Vac/50 Hz, and 230 Vac/60 Hz configurations.

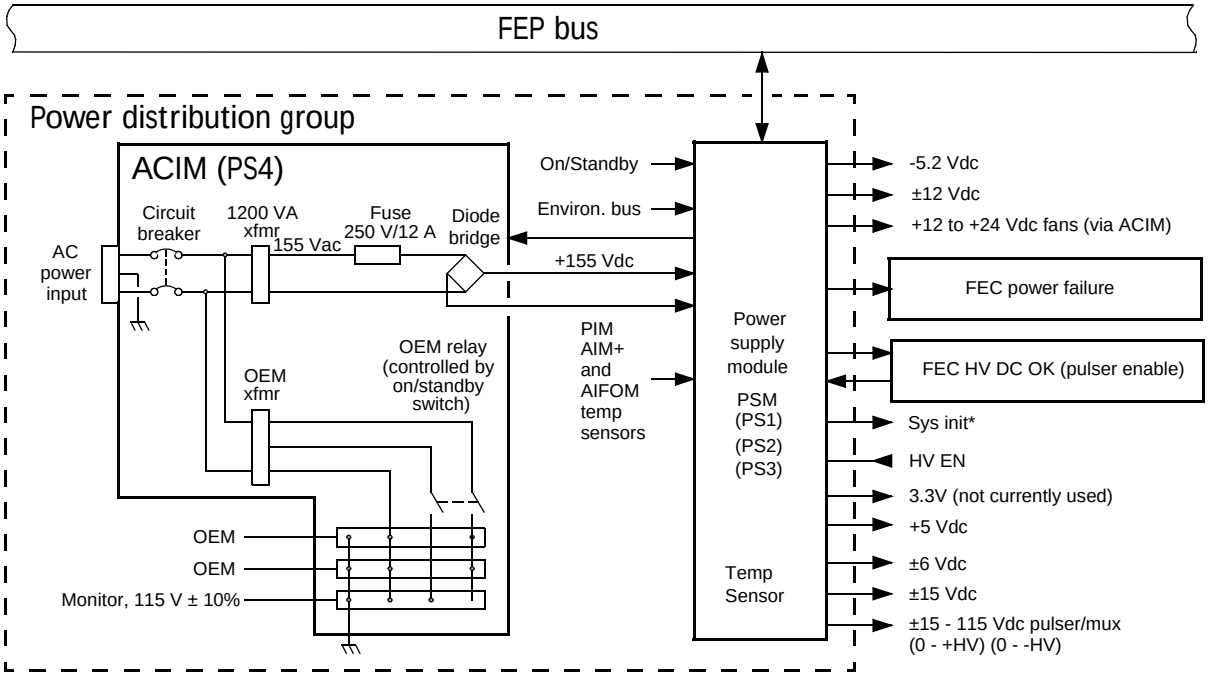
The Power Subsystem also includes a shielded line cord, On/Off circuit breaker, a ferro-resonant isolation transformer, a linear transformer, resonant filter capacitors, manual ON/STANDBY switch (on user interface), software-controlled power ON/STANDBY switch (controlled by CPU), and overload protection in the individual power supplies (watchdog circuitry on FEC). All power supplies plug directly into the centerplane to supply all DC power.

There are no power supply adjustments. The subsystem converts high-voltage AC into DC voltages, and buses these DC voltages over the centerplane to the modules that require them. Status LEDs on the ACIM and PSM are covered in Section 8, “Troubleshooting”. Refer to “Output Power Monitor Theory” on page 86.

The voltages supplied by the PSM are:

- +5 Vdc
- -5.2 Vdc
- ±6 Vdc
- ±15 Vdc
- ±12 Vdc
- +12 to +24 Vdc (fans)
- ±115 Vdc (0 to +HV and 0 to -HV for variable pulsers)

Figure 4-2 Power Subsystem



Power Subsystem Operation

The Power Subsystem operates in three modes:

- Power-Up

  Brief initialization period after system circuit breaker is turned on.

- STANDBY

  ON/STANDBY switch remains in STANDBY. Power supplies on; no power to card cage or internal OEMs; system INIT* set low.

CAUTION

HVDC is present on the Centerplane.

- ON

  ON/STANDBY switch set to ON. All power rails turned on, system initialized, no faults detected, OEM voltages enabled.

Refer to "Output Power Monitor Theory" on page 86 for information about the watchdog circuits mentioned below.

Power-Up Mode – occurs when the system circuit breaker is turned on. During power-on:

- PSM powers its ON/STANDBY circuit
- All Power Subsystem outputs are disabled
- PSM resets latches to enable the Vicor power supplies
- The system is placed into STANDBY mode

STANDBY to On Mode – PSM monitors the ON/STANDBY signal from UIF via the SCIP bus. When the ON/STANDBY switch is set to ON, the following occurs:

- Card cage voltages are enabled and monitored by the FEC for operation within ON mode limits.
- Fans start at full speed. After timeout, speed is adjusted to minimize fan noise while maintaining normal operating temperature.
- +5V Vicor power supply comes up.

- System begins initialization; system INIT* set to high.
- OEM power is enabled.
- PSM watchdog circuit sends data to FEC regarding HV voltages.
- PSM monitors Power Subsystem and airstream temperature.
- FEC interprets the voltage, current, and temperature values and responds by updating ACIM LEDs.

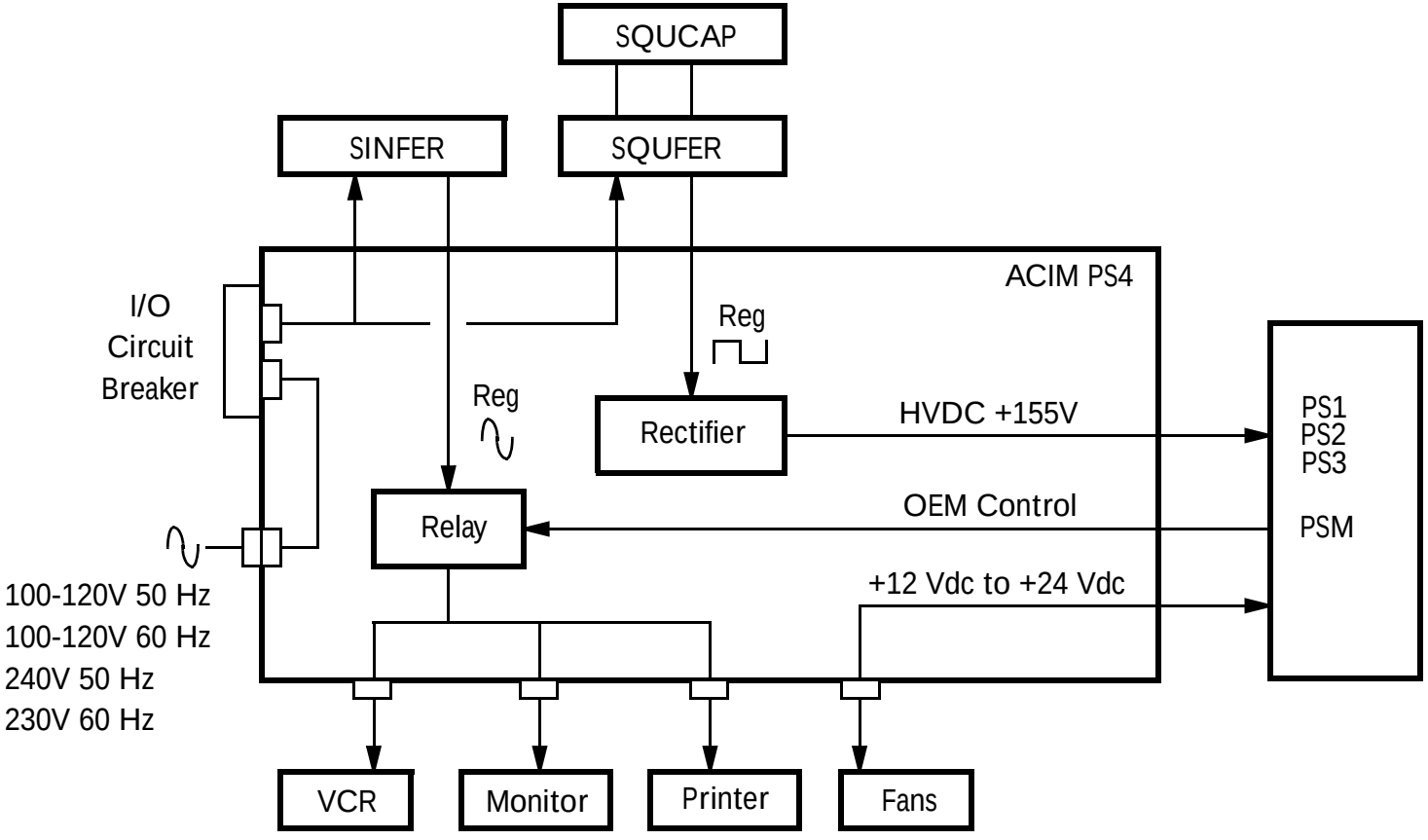
On to STANDBY Mode – PSM monitors the ON/STANDBY signal from CPU via the SCIP bus. When the ON/STANDBY switch is set to STANDBY, the system is set to STANDBY mode as follows:

- Contents of static RAM are copied to non-volatile RAM (time, temperature, status).
- System CPU starts time-out for system shutdown.
- FEC requests permission to enter STANDBY mode from CPU via SCIP bus and starts a time-out to prevent software lockup.
- PSM watchdog circuit stops sending data to FEC. If FEC does not respond to PSM watchdog circuit, PSM shuts down HV supply.
- CPU initiates a wait period and saves active operating parameters to non-volatile RAM. If CPU does not respond, FEC proceeds with standby sequence.
- HV supply disabled.
- Power removed from internal OEMs.
- System INIT* is set low to reset the system.
- Card cage voltages are disabled (fans are off).

AC Input Module (ACIM) - PS4

- AC input receptacle (Figure 4-3), I/O circuit breaker (main power switch), ground stud and LED display
- LEDs provide diagnostic information (See Section 8, “Troubleshooting”)
- Provides power interface to transformers and OEMs
- Provides HVDC to PSM

Figure 4-3 ACIM Module



Power Supply Module (PSM) - PS1, PS2, PS3

- Provides -5.2 Vdc, +5 Vdc, ±6 Vdc, +3.3 Vdc (not currently used), +12 Vdc to +24 Vdc, ±12 Vdc, ±15 Vdc, 0 to +HV, and 0 to -HV
- Monitors thermistors located on PCBs around the card cage (PSM, AIM+, PIM, and AIFOM). Averages temperature from thermistors and controls voltage to system fans. (Power supply is disabled in Standby. Fans are not functional.)
- Provides variable HV. Powers HV pulsers and scanheads with HV multiplexers. Generates voltages from ±15 Vdc to ±115 Vdc
- Disables all power supplies if HVDC goes below +90 Vdc
- HV watchdog circuit detects if the FEC fails to monitor the HV voltages/currents. Enables the user to shut down the system if the FEC fails or is not installed
- Monitors HVDC and notifies the CPU if it goes below 100 Vdc. CPU uses this information to protect storage devices against data corruption
- Relays status of HVDC from the ACIM to the FEC
- PSM diagnostics are performed by the FEC, voltage, current, and system temperature monitoring
- Monitors individual power supplies for over-voltage conditions and shuts down faulty power supplies
- Contains system “standby” circuitry
- Enables OEM power

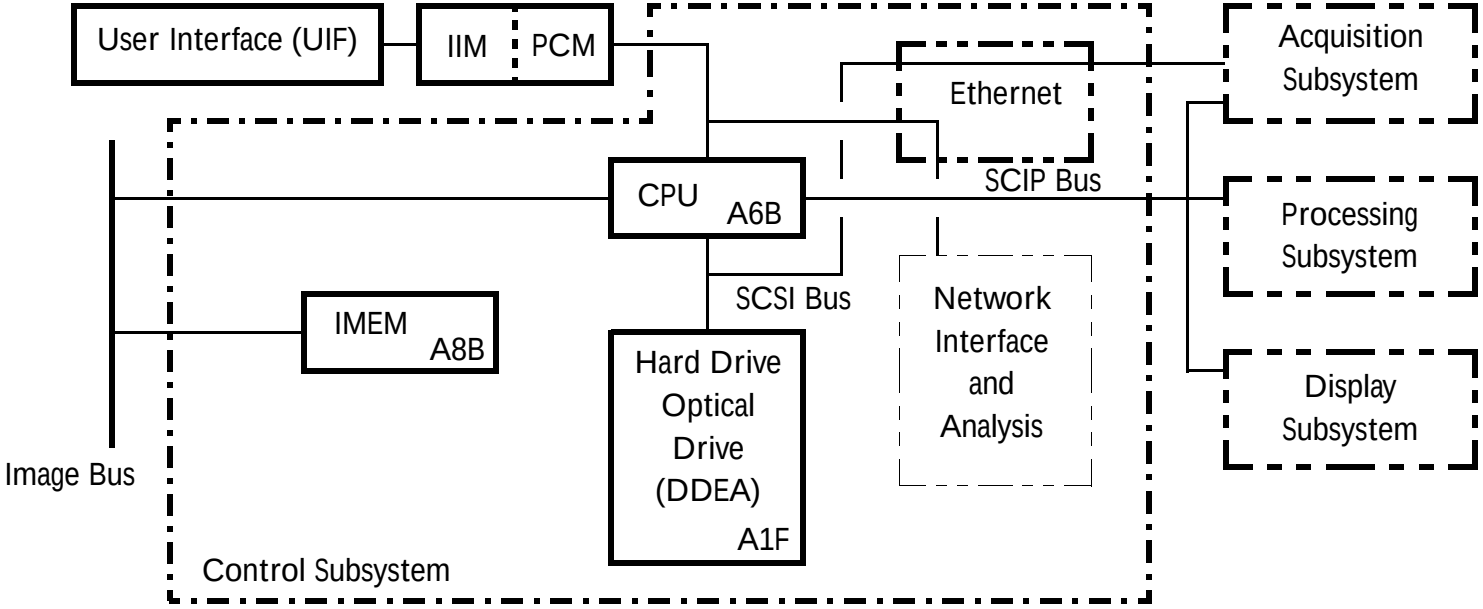
Control Subsystem

The Control Subsystem (Figure 4-4) monitors user input, gives status to the user through UIF, provides system coordination, provides data storage, and service access.

The Control Subsystem consists of:

- System CPU Module (CPU)
- Image Memory Module (IMEM)
- Disk Drive ECG Assembly (DDEA)

Figure 4-4 Control Subsystem Block Diagram



System CPU - A6B

- Motorola 68040 microprocessor; VX Works operating system.
- Loads modules requiring operating software at boot-up.
- Transfers scanhead tables to the FEC as needed.
- Generates coefficients and data tables for Processing Subsystem.
- Performs analysis calculations.
- Queries Power Subsystem for Acoustic Power & Intensity (AP&I) status.
- X-bus interface to Display Subsystem (PCM).
- Time and date.
- Stores user setups.
- 32 Mb RAM for Image Management. 48 Mb RAM for systems with Performance 2000 upgrade (17X.XX software). Additional RAM supports addition of the Performance 2000 feature set.
- Verifies major H/W, F/W, S/W revision, upgrade compatibility.
- Performs system diagnostics and stores results.

Image Memory (IMEM) - A8B

- 64-Mb RAM for data storage
- Provides Image Bus arbitration, control, and timing
- Reports PCB board revision and SIMM data to system CPU

- Stores data from ADAPTR for transfer to PSP or PCM, or both
- Stores data from PCM for transfer to PSP during framegrab
- History buffers for 2D Echo, 2D Color, M-mode Echo, Color M-mode, Scrolling Doppler, Physio, and High Q Analysis

Disk Drive ECG Assembly (DDEA) - A1F

- Houses optical drive and hard drive of varying capacities. All hard drives formatted to 2100 Mb because of operating system constraints.
- Provides SCSI interface to the optical and hard drives.
- Provides +5-Vdc and +12-Vdc power to the optical and hard drives.
- Connects and low-pass filters footswitch signals to the PCM.
- Amplifies and filters ECG, Aux ECG, Respiration, Channel A, and Channel B signals. Routes signals to ADAPTR.
- Reports PCB board revision to system CPU.

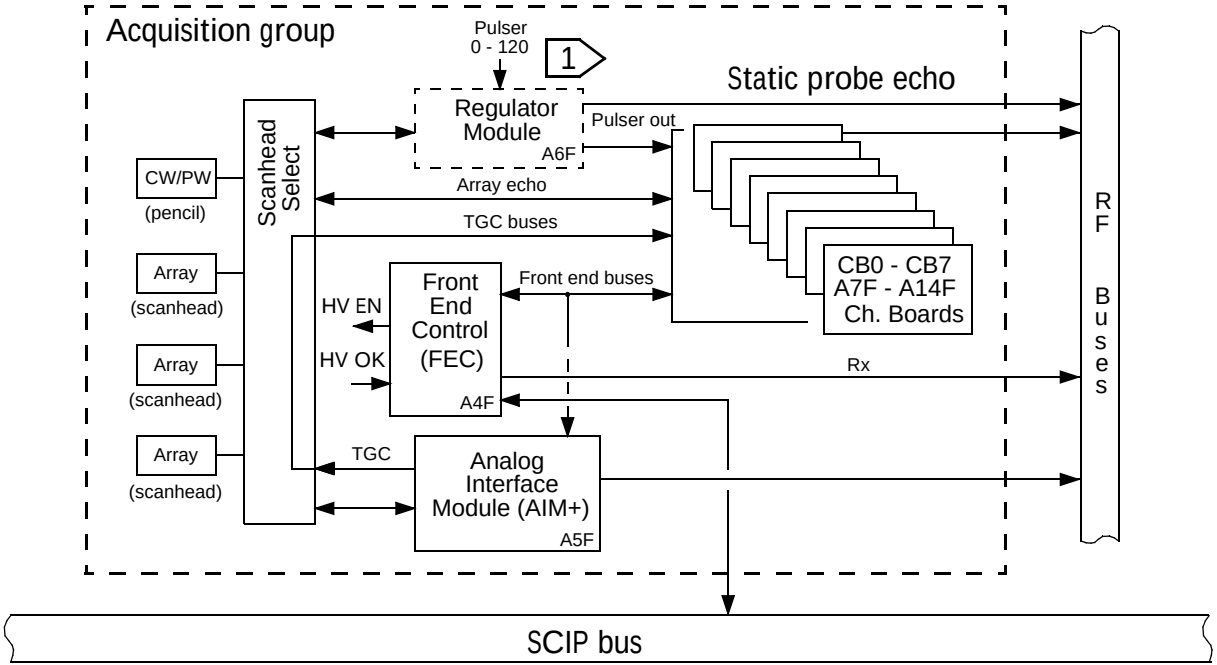
Acquisition Subsystem

The Acquisition Subsystem (Figure 4-5) controls the transducer, generates the electrical impulse (pulse) that creates sound waves, and converts the returning echo information into digital data.

The Acquisition Subsystem consists of:

- Front End Controller Module (FEC)
- Scanhead Select Module (S/HSEL)
- Eight Channel Boards (CB0 - CB7)
- Analog Interface Module Plus (AIM+)
- Regulator Module (only in systems with a depopulated AIM+ PCB shipped prior to April 1998, PCB P/N 7500-1026-XX)

Figure 4-5 Acquisition Subsystem



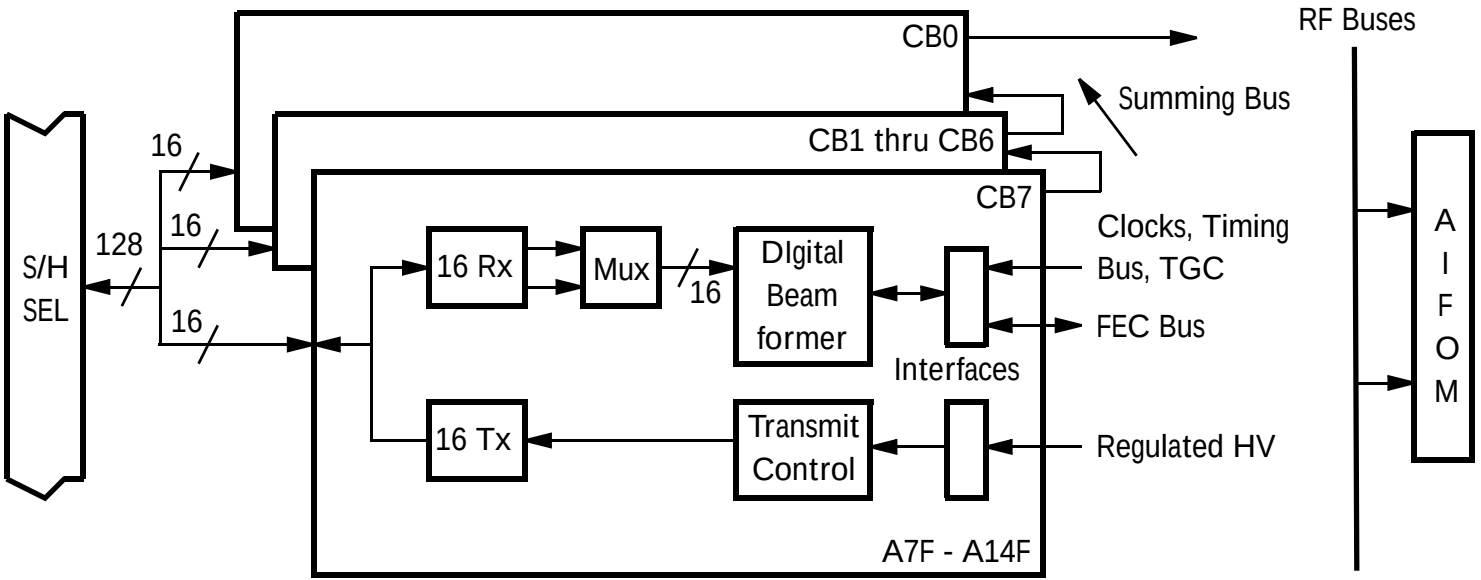
1 Regulator Module functions were moved to the AIM+ PCB for systems shipped after April 1998.

Front End Controller (FEC) - A4F

The FEC downloads operational parameters from CPU and provides real-time control of the front end for transmit, receive, and beamforming functions.

- Interfaces with CPU via SCIP bus to determine scanning sequence and mode of operation.
- Provides timing signals for Tx and Rx cycle.
- Controls scanhead selection, personality, and HV Mux through the AIM+ and S/HSEL.
- Sends scanhead operating parameters to Channel Boards through FEC bus.
- Receives scanning sequence instructions from CPU and generates digital TGC, PRI and other timing sequencing.
- Controls sample volume cursor position to the AIFOM.
- Monitors voltages from PSM via FEP bus.
- Generates RF headers for image data to AIFOM.
- AP&I power monitor control.
- Bus Interfaces: SCSI, FEP, Clock, SHC, TGC, RF, TTag, FEC, Sync, SC, and SCAN (See “Bus Functions” on page 89).
- Changes to FEC for systems with 170.XX software and higher allow more imaging modes to be selected, such as SonoCT Real-time Compound Imaging.
- Supports dual AIFOMs for systems with 170.XX software and higher.
- Integrated CSI and Pulse Inversion.

Figure 4-6 **Channel Boards** - A7F through A14F



Channel Boards - A7F through A14F

- Channel Board RAM is loaded with operational parameters for selected scanhead. Parameters define Tx, Rx, and beamforming behavior for each scan line and depth.
- Transfers data under FEC control for each new PRI.
- Transmit apodization/power control under FEC control.
- Transmits to, and receives from, transducer elements under FEC control.

- Digitizes RF, beamforms, adds TGC, and sends digital Rx data to Processing Subsystem over the RF buses for all modes.
- Anti-aliasing filtering.
- Static CW RF receive and mix to baseband (Channel board 0).
- Static PW transmit, receive, and process (Channel board 1).
- Steered CW receive and mix to baseband.
- 512 channels

  1024 channels for SonoCT systems.
- Bus Interfaces: Summing, TGC, RF, Clocks, Timing, FEC, and FEP.

Analog Interface Module Plus (AIM+) - A5F

- Generates system clock frequency of 240 MHz
- Subdivides the clock frequency into 120, 80, 60, 48, 30, and 24 MHz
- Supplies clock frequencies (80, 60, 48, 30, and 24 MHz) to centerplane for distribution to other PCBs
- Supplies 120 MHz to S/HSEL
- Receives +5 Vdc, +6 Vdc, ±15 Vdc, ±80 Vdc, and -5.2 Vdc from centerplane and regulates ±15 Vdc to become +10 Vdc, and ±12 Vdc
- Supplies ±80 Vdc, ±12 Vdc, +10 Vdc, and +5 Vdc to S/HSEL.
- Generates and monitors two analog TGC voltages. Supplies TGC signals to S/HSEL for use by Channel PCBs.
- Receives I/Q CW signals from Channel PCBs for steered and static CW processing.
- Thump filter, variable wall filters, and low-pass anti-aliasing filters for I/Q.

- Digitizes I and Q using 16-bit AD converters. Exports I and Q to RF buses.
- Sends S/HSEL status and personality data to FEC via FEP bus.
- Buffers and provides HV Mux selection data to the scanhead.
- FEP bus interface.
- Relay control for desired scanhead on S/HSEL.
- Thermal sensor to monitor internal system temperature for fan speed control.
- Scanhead temperature sensing to FEC via FEP.
- Supplies high voltage to HV Muxes on S/HSEL.
- Supports acquisition with the MPT7-4 scanhead (motor control for 3D acquisition) on Performance 2000 systems (17X.XX software).

Regulator Module - A6F

NOTE The functions listed below were moved to the AIM+ PCB for systems shipped after April 1998.

- Regulates HV from PSM to Channel PCBs
- Controlled by FEP Bus interface

Scanhead Select Module (S/HSEL)

- Selects between the scanhead connectors
- Interfaces between the front-end PCBs and the scanhead
- Connects the TGC control voltages from the AIM+ to the Channel boards
- Connects the baseband CW quadrature current bus from the Channel boards to the AIM+
- Connects the 120-MHz clock signal from the AIM+ to the Regulator Module

- Connection and mux for transducer elements and the channel boards for array transducer
- Provides connection for static CW and TCD transducers

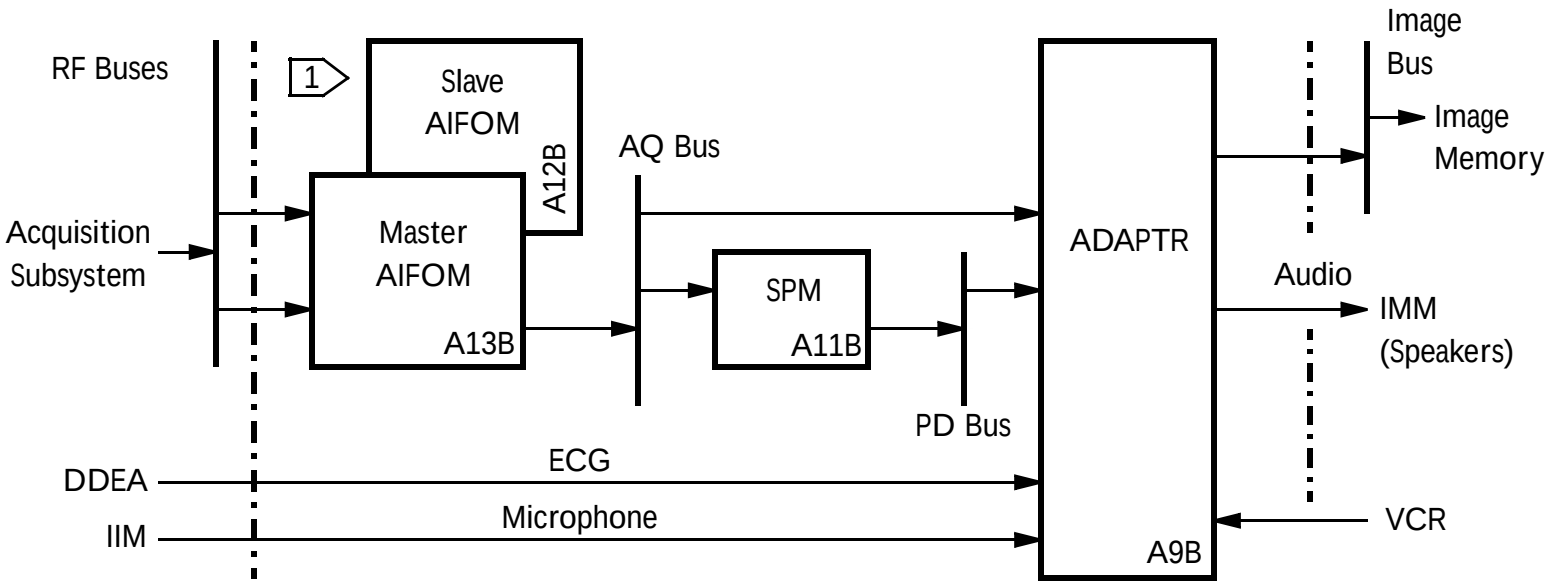
Processing Subsystem

The Processing Subsystem (Figure 4-7) filters the echo information, and transforms it for display processing. The processing subsystem generates Doppler audio and routes various audio sources to the speakers and VCR. The processing subsystem digitizes, filters, and transforms ECG data for the display. Post-processing and data storage for zoom take place in this subsystem.

The Processing Subsystem consists of:

- Single Advanced IF Output Module (AIFOM) on systems below 17X.XX software
- Dual Advanced IF Output Modules (Master and Slave AIFOMs) on 17X.XX systems
- Signal Processing Module (SPM)
- Advanced Digital Audio and Physio Translator Module (ADAPTR)

Figure 4-7 Processing Subsystem



1 Dual AIFOMs used only in systems with 170.XX software and higher.

Advanced Intermediate Frequency Output Module (AIFOM) - A12B/ A13B

- Processes 2D, Color Flow, Spectral Doppler, and M-mode data.
- Synthetic aperture.
- Dynamic Range.

- Demodulates all beamformer data (except CW Doppler) into In-phase and Quadrature data (I and Q).
- Additional processes for 2D and M-mode echo data are amplitude detection, multi-zone reconstruction, and multi-rate filtering.
- CW Doppler passes through AIFOM without being processed.
- Uses 24-MHz clock to time data onto the PCB from the RF buses and control data flow through the PCB.
- Receives 60-MHz and 40-MHz clocks from the centerplane and divides the signals for use in MOP and SCIP circuits.
- Dual AIFOMs installed on systems with 17X.XX software. All other systems have single AIFOM.
- A13 is Master AIFOM. A12 is Slave. Controlled by system software.
- A12 AIFOM is used only for high frame-rate mode and for Intelligent Frame Rate Accelerator operation.

Signal Processing Module (SPM) - A11B

- Processes Color Flow, Spectral Doppler, and M-mode data. Also processes 2D on systems with 124.13 software and up.
- Processes 2D persistence and Dynamic Contrast Enhancement on systems with 124.13 software and up.
- Velocity, variance, and power.
- Color Flow processes include Dynamic Motion Differentiation (DMD), wall filter, 2D auto correlation, and spectral estimation.
- Color Flow processing includes persistence, hole filling, and segmentation.

- Spectral Doppler processing includes wall filter, gain, FFT, gap fill, averaging, interpolation, and High Q Automatic Doppler calculations (mean and peak).
- Doppler processing includes Hilbert Transformation to generate forward and reverse audio.
- M-mode processing includes temporal filtering/decimation.

Signal Processing Module Plus (SPM+) - A11B (170.XX Systems and Above)

- All signal paths go through SPM+. All data path functions are programmed through software
- Contains two daughterboards with DSPs for additional processing power
- Operating speed increased from 32 MHz to 40 MHz
- Performs SonoCT Real-time Compound Imaging functions

Advanced Digital Audio, Physio, and Translator Module (ADAPTR) - A9B

- Translates Acquisition Bus (AQ) or Processed Data (PD) bus headers to image bus addresses as part of the transfer to AQ bus and PD bus data to Cineloop/history buffers in IMEM
- Maintains buffer descriptors in IMEM for all data types output by this module
- Provides bus arbitration, error monitoring, and clock generation for the AQ and PD bus
- Provides ECG A/D conversion, filtering, display gain/positioning
- Triggers front-end acquisition based on ECG R-wave detection
- Sends heart-rate info to CPU based on ECG R-wave detection
- Provides a D/A audio-reproduction path for Doppler audio
- Selects speaker source between Doppler and VCR
- Provides volume control and mute for speakers

- Routes microphone to VCR
- Provides audio connectors for external VCR
- Processes microphone and VCR audio; A/D conversion, gain and filtering

Display Subsystem

The Display Subsystem (Figure 4-8) formats the echo information for display, and transfers it to the video monitor and peripheral devices.

The Display Subsystem consists of:

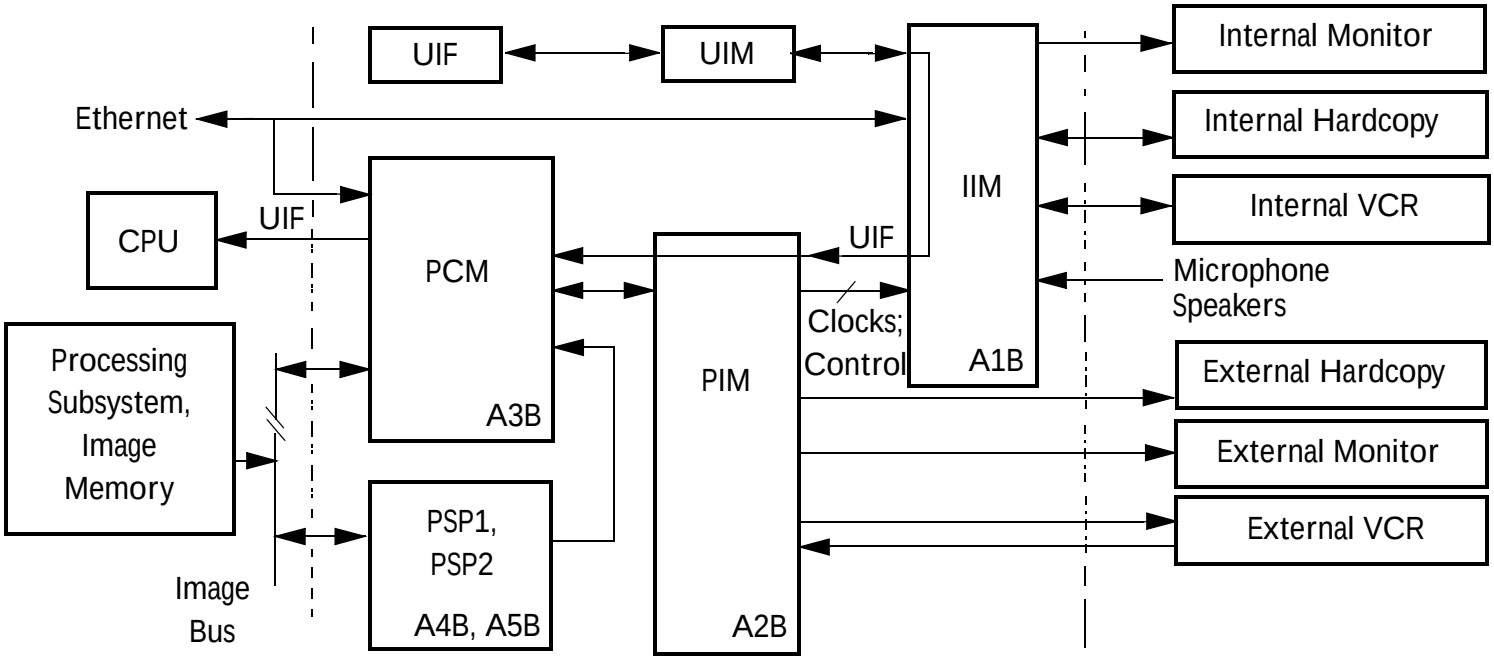
- User Interface Module (UIM)
- Pixel Space Processors 1 and 2 (PSP1 and PSP2)
- Pixel Conversion Module (PCM)
- Peripheral Interface Module (PIM)
- Internal Interface Module (IIM)

User Interface Module (UIM)

- Upper and lower control panels (UCP and LCP)
- User Interface Module (UIM)
- Controlled by PIM
- User interface for pull down menus for functions that are user options and dedicated controls for functions used during examinations

NOTE System self-diagnostics includes the UIM as part of the Display Subsystem.

Figure 4-8 Display Subsystem



Pixel Space Processor (PSP1 & 2) - A5B, A4B

- Acquires image data from IMEM
- 2D scan conversion
- Zoom
- Static and scrolling graphics
- Freeze (buffer memory located on PSP1)

Pixel Conversion Module (PCM) - A3B

- Controls UIF window displays (X-windows)
- Gray scale and color LUTs (look-up tables)
- Converts non-interlaced 60/50 Hz to interlaced 30/25 Hz for OEMs
- Gray and color bar generator
- Hidden digital data
- Provides image background and image windows
- Monitors user interaction including keystrokes, trackball movement, and footswitch activity
- All graphics and overlay capabilities
- User interface windows, menus, and icons
- Framegrab functions

Peripheral Interface Module (PIM) - A2B

- Controls UIF through UIM (control PIM)
- Encode/Decode NTSC and PAL composite Y/C video (video PIM)
- System video sync (video clock) originates on AIM+ (video PIM)

- Controls internal OEMs through IIM (video PIM)

Internal Interface Module (IIM) - A1B

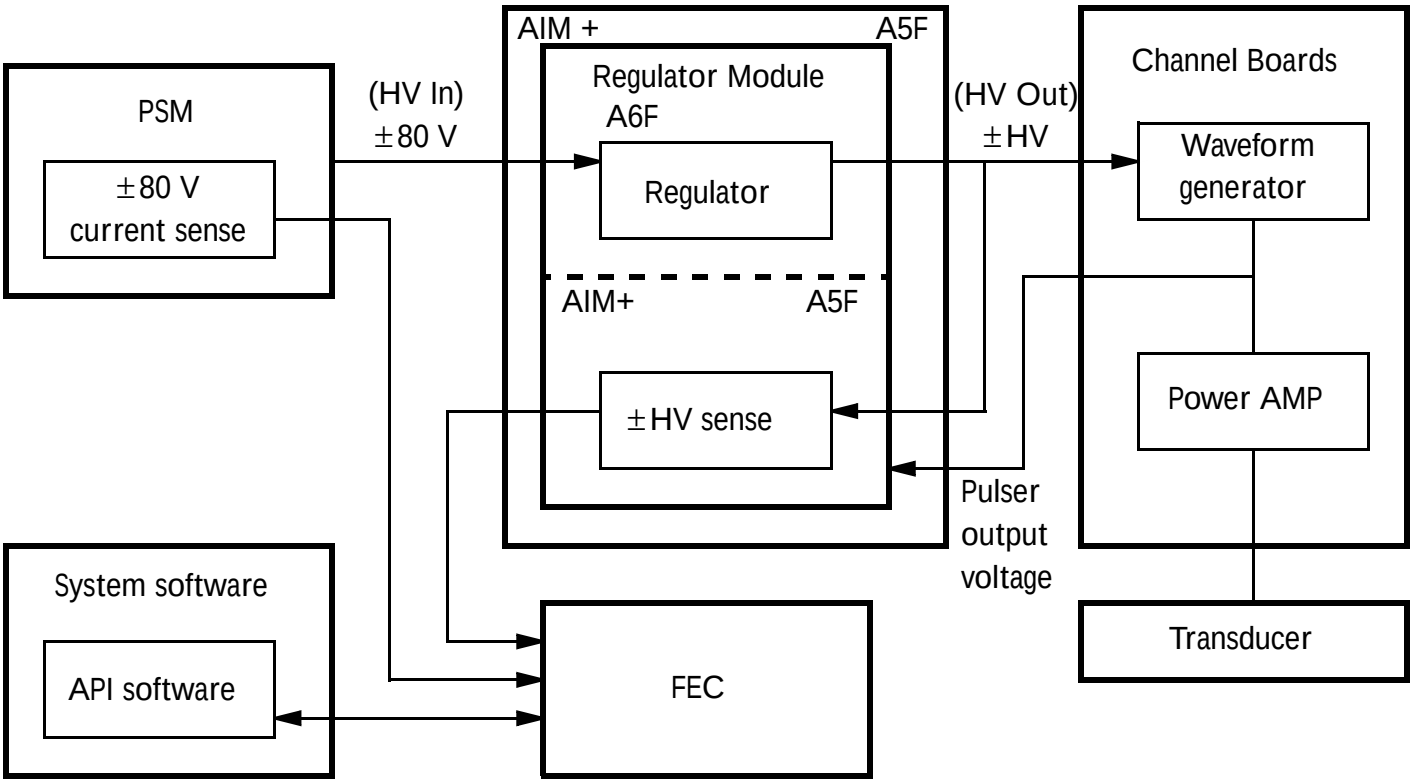
- Routes video signals to and from monitor, hardcopy devices, and VCR (No video processing is done on IIM)
- Buffers and routes audio signals to and from VCR
- Amplifies and routes audio signals to the speakers in the monitor housing
- Routes logic signals to and from the monitor, hardcopy devices, and UIM
- Buffers the signal from the microphone to the system

Output Power Monitor Theory

Output power monitor (Figure 4-27) provides patient safety by ensuring the system is operating within acoustical power and intensity (AP&I) limits. It also protects hardware from destructive or unsafe conditions. It consists of AP&I software, which resides on the System CPU; FEC software; PSM firmware; Power Subsystem monitors in each power supply; Regulator Module; pulser monitors in each channel board; and a beamformer monitor.

The output power monitor is designed to detect any single failure in the system, for example, a faulty power supply, a faulty beamformer, a software failure, a defective scanhead or scanhead data files. Mode information, (PRI, voltage, burst, and so forth) sent to the beamformer is also verified before allowing the beamformer to start. This prevents the system from inadvertently creating a temporary over-power condition.

Figure 4-9 Power Monitor Block Diagram



Both software and hardware watchdogs disable the transmit function when errors are detected. Software watchdogs monitor variable parameters (for example, AP&Is vary from scanhead to scanhead). When the software watchdog in the system CPU receives an error report from a power monitor, it disables the system from transmitting. Hardware watchdog circuits disable or

shut down the system when maximum, and in some cases minimum, parameters are exceeded (for example, minimum power supply output voltage or minimum current limits).

The CPU uses the AP&I software program and system control settings to calculate the required power output for the selected transducer and operating mode. These values are sent to the channel boards to control generation of pulsers for the beamformer. Voltage and current monitors compare the measured pulser control values with the allowable limits listed in the AP&I software tables.

NOTE Software AP&I tables contain power maximums for each transducer in its allowed operating modes. AP&I theory is included in the *Scanheads and Safety* manual (P/N 4701-0027-XX). AP&I tables are included in the *Acoustic Output Tables* manual (4706-0027-XX).

The power monitor also provides system and hardware protection through hardware watchdog circuitry for maximum voltage, maximum pulser currents, and output electrical power. When measured parameters exceed allowable values, the power monitor circuitry disables the supply and signals the error to the system CPU.

The beamformer monitors the average pulser voltage supplied to the beamformer, pulser output voltage, and average current. If monitored values exceed the maximums for voltage and pulser currents, maximum pulser output electrical power, and maximum pulser power dissipation, the beamformer software watchdog disables the beamformer and signals the system controller.

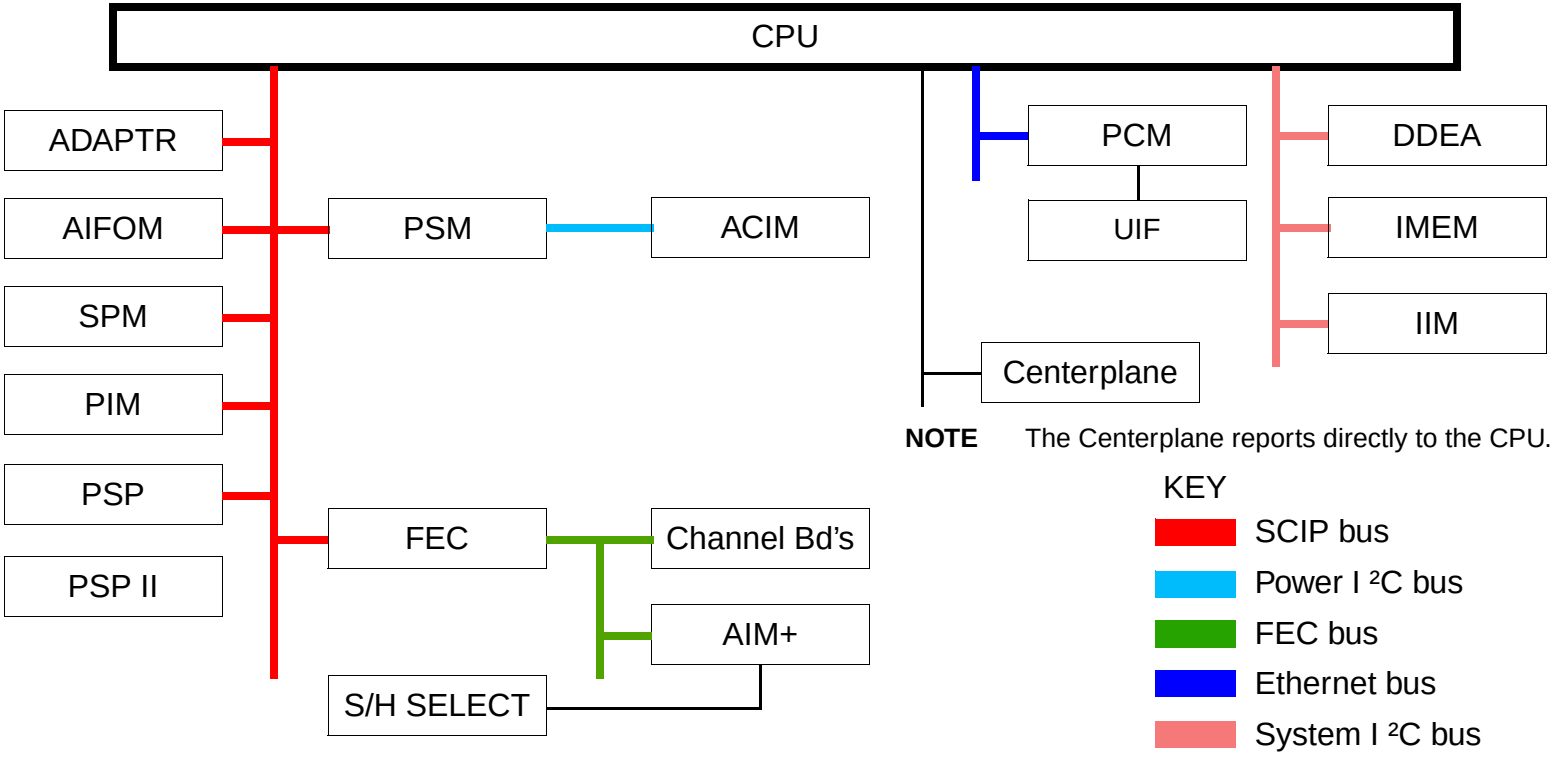
Timeouts in the system software verify that the system software can communicate with the FEC and the Power Subsystem. If either subsystem is not active and functioning, the system stops the beamformer and shuts down the pulser supply. Timeouts are initiated at regular intervals and acknowledged by the affected circuits, if operating properly.

Timeout alerts usually are reset if mode, power, or some other function is changed.

Bus Functions

The HDI 5000 bus structure is illustrated in Figure 4-10.

Figure 4-10 HDI 5000 Bus Structure



Control Subsystem Buses

Serial Control Interface Processor (SCIP)

- Relieves Module Operation Processor (MOP) in servicing control bus activity
- Master-slave multi-drop communication network

Small Computer System Interface (SCSI)

- Interfaces optical and hard disk drives to CPU
- Provides an external port for future use

Acquisition Subsystem Buses

FEC Bus

Provides operational parameters, and controls use of them by Channel Boards.

Timing Bus

- Carries real-time control signals to Channel Boards, AIM and DOPACQ.
  - Carefully controlled to ensure sync with front-end clocks
  - Start and stop Tx/Rx cycle
  - Controls output of the front-end ultrasound data on SUM and RF buses

FEC Sync Bus

Transfers real-time motor control sync data between Motor Servo and FEC.

Power Supply Sync Bus

Transfers real-time high-voltage power-supply status between FEC and PSM to sync starting, stopping, and power level changes in the system.

SUM Bus

Daisy-chained bus that passes from Channel Board to Channel Board carrying the partially beamformed sum. Each Channel Board sums its channels. It then sums its result with the sum of the previous Channel Board and passes the result to the next Channel Board.

S/H Control Bus

Unidirectional bus between FEC (master) and AIM.

RF Buses

Carry data from the front end to the AIFOM on two separate RF buses.

Digital TGC Bus

- Carries current digital value of TGC curves and digital values for pulser voltage regulators.
- AIM receives digital TGC values for D-to-A conversion to analog TGC voltages.
- AIM receives digital pulser values for D-to-A conversion to a high-voltage analog DC value for each channel.

Analog TGC Bus

Two differential analog buses on S/HSEL driven by AIM and received by all Channel Boards for two variable gain stages.

CW Sum Bus

- Differential current bus on the S/HSEL driven by Channel Boards.
- AIM receives and processes current representation value of beamformed CW data.

FEP Bus

Extension of CPU bus on FEC bus used for nonreal-time tasks such as output power monitoring and scanhead interface control (controls scanhead personality access, sends relay pulses to the S/HSEL module, and senses the scanhead disconnect status). The FEP bus is an extension of the FEC's CPU bus.

Time Tag Bus (TTag)

Used by digital signal processing modules for time tag data. FEC generates time-tag signals.

Processing Subsystem Buses

Acquisition Bus (AQ)

- Transfers real-time data from AIFOM to SPM or ADAPTR.
- Transfers I/Q test data from ADAPTR to SPM.
- ADAPTR module provides the clocks, bus arbitration, and bus monitoring for AQ bus.

Processed Data Bus (PD)

- Transfers real-time data from SPM to ADAPTR.
- Transfers color-test data from SPM to ADAPTR.
- ADAPTR module provides the clocks, bus arbitration, and bus monitoring for PD bus.

Data Paths

Data path block diagrams are contained in Figure 4-11 through Figure 4-26. The data paths in the illustrations are shown by thick dashed lines. Solid thin lines indicate that a connection exists but is not used for that data path.

Figure 4-11 2D/PW/Color Front End Signal Path

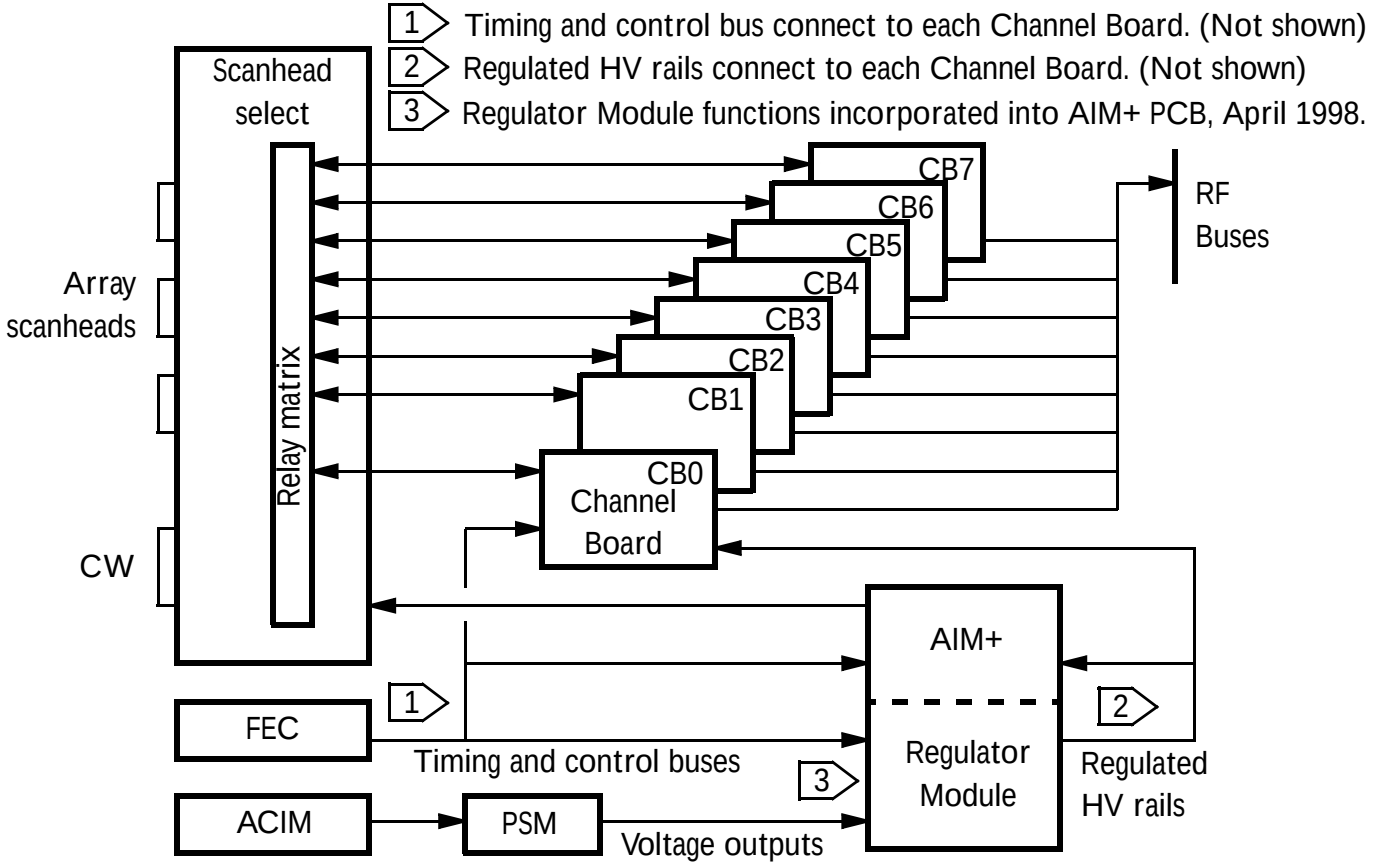


Figure 4-12 2D Signal Path (108.XX Systems and Below)

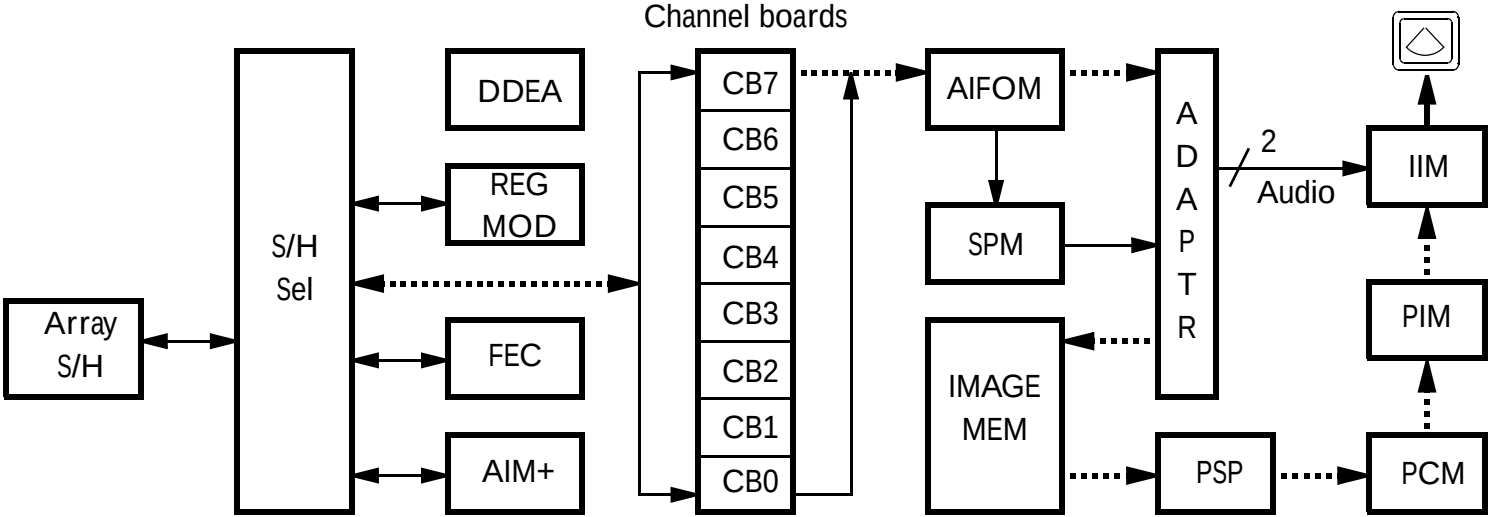


Figure 4-13 2D Signal Path (124.13 through 127.XX Systems)

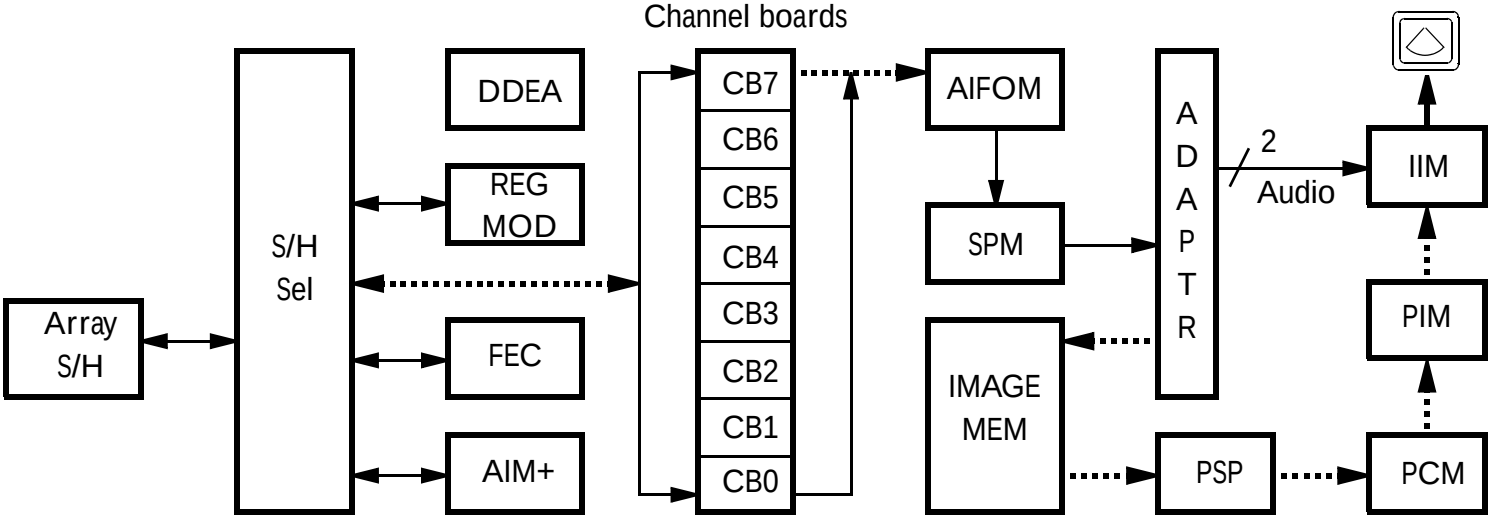


Figure 4-14 2D Signal Path (170.XX Systems and Above)

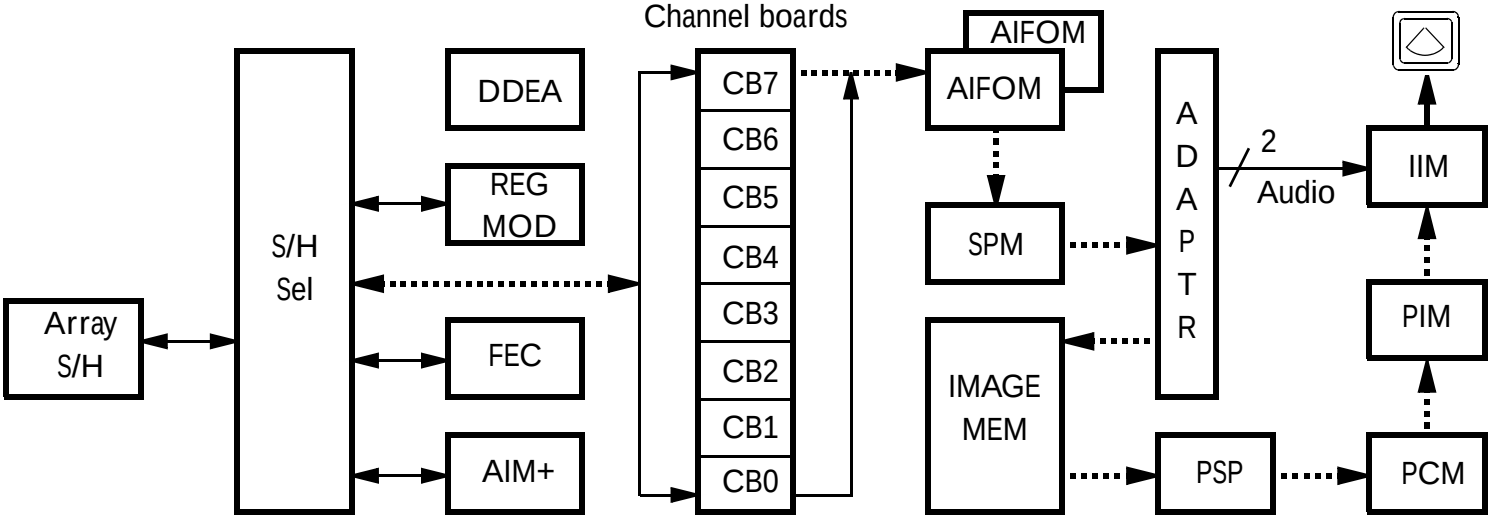


Figure 4-15 PW Doppler and Color Path (108.XX Systems)

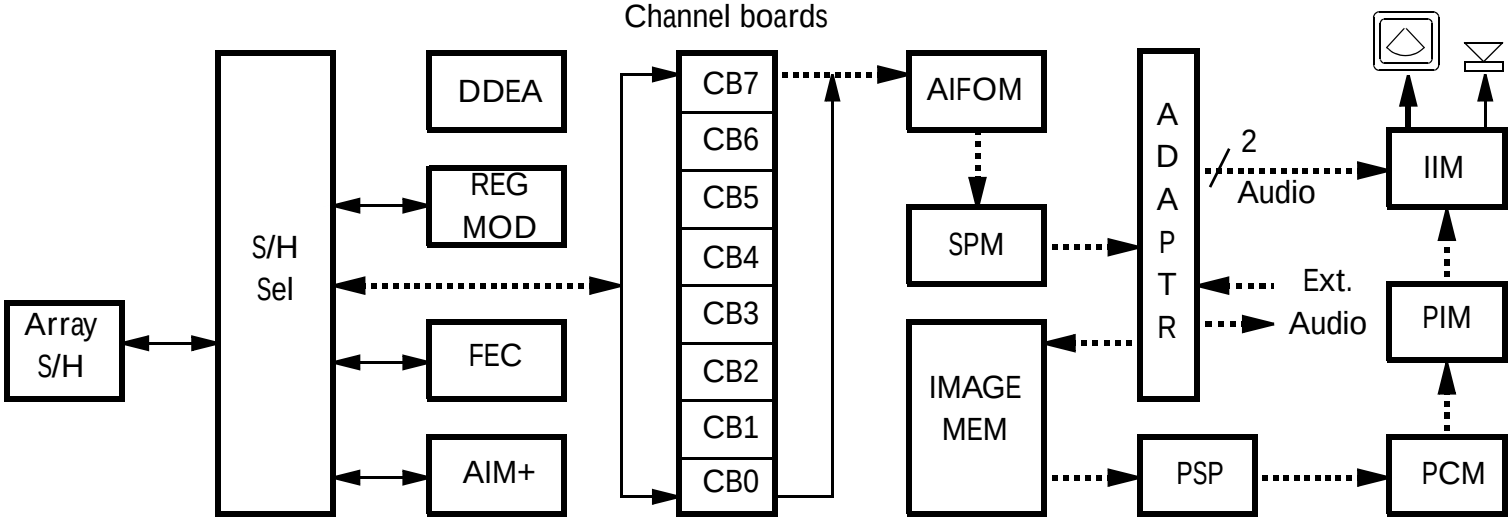


Figure 4-16 PW Doppler and Color Path (124.13 Through 127.XX Systems)

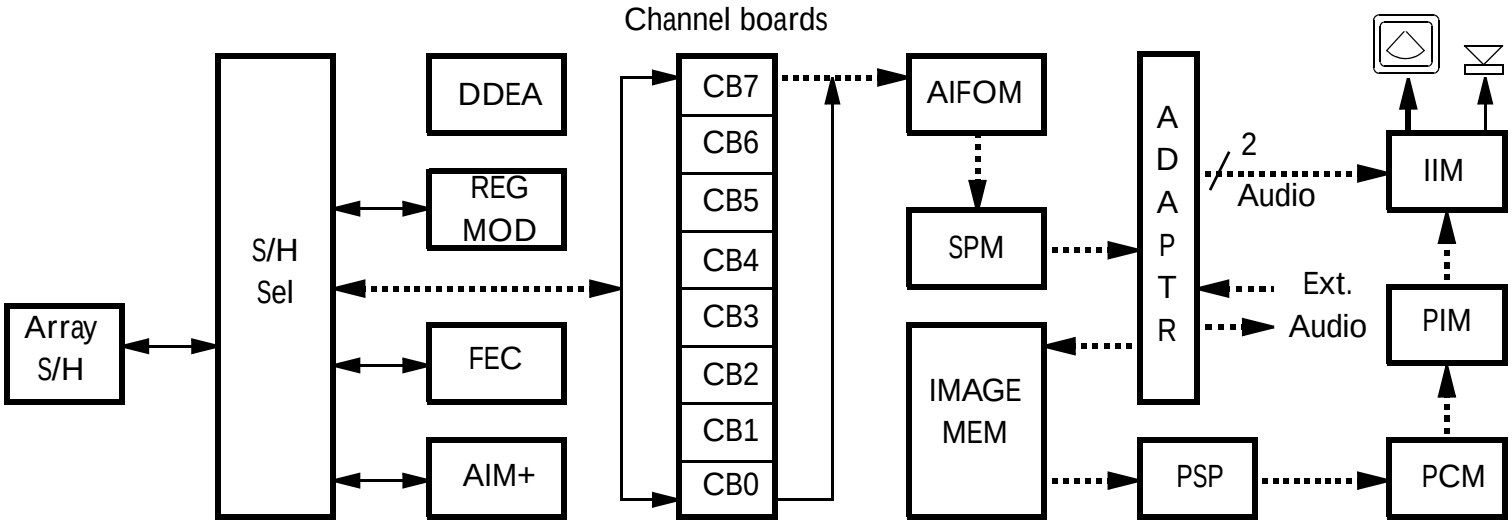


Figure 4-17 PW Doppler and Color Path (17X.XX Systems)

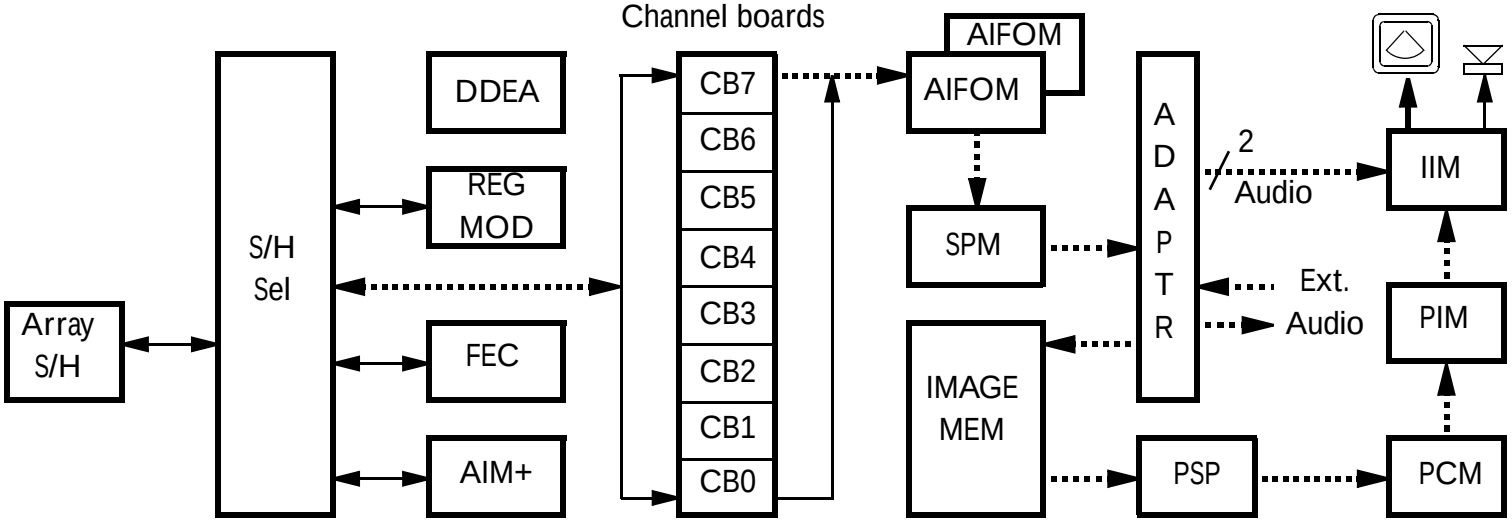


Figure 4-18 Static PW Front End Signal Path

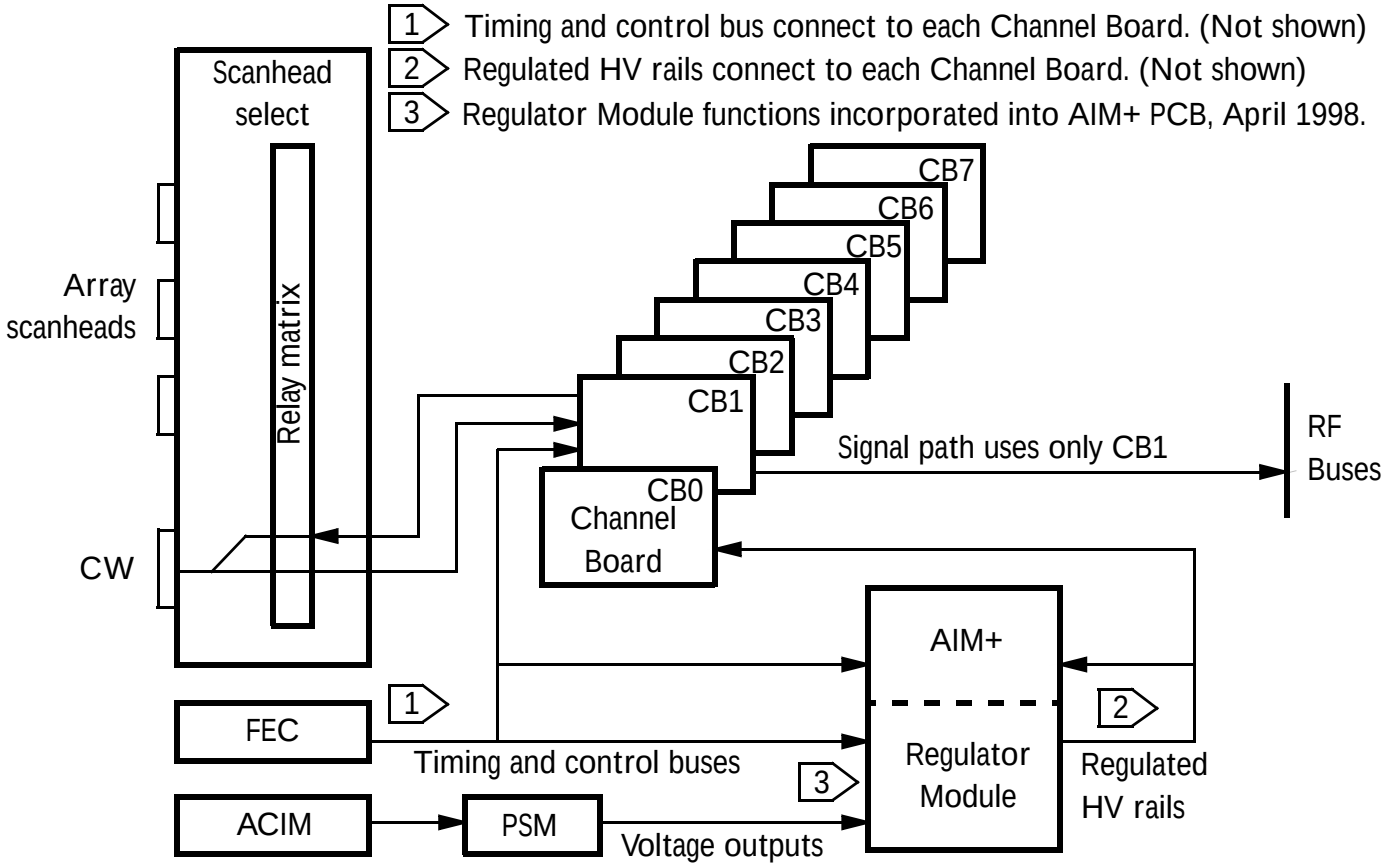


Figure 4-19 **CW and Static PW Doppler (TCD) Signal Path (127.XX Systems and Below)**

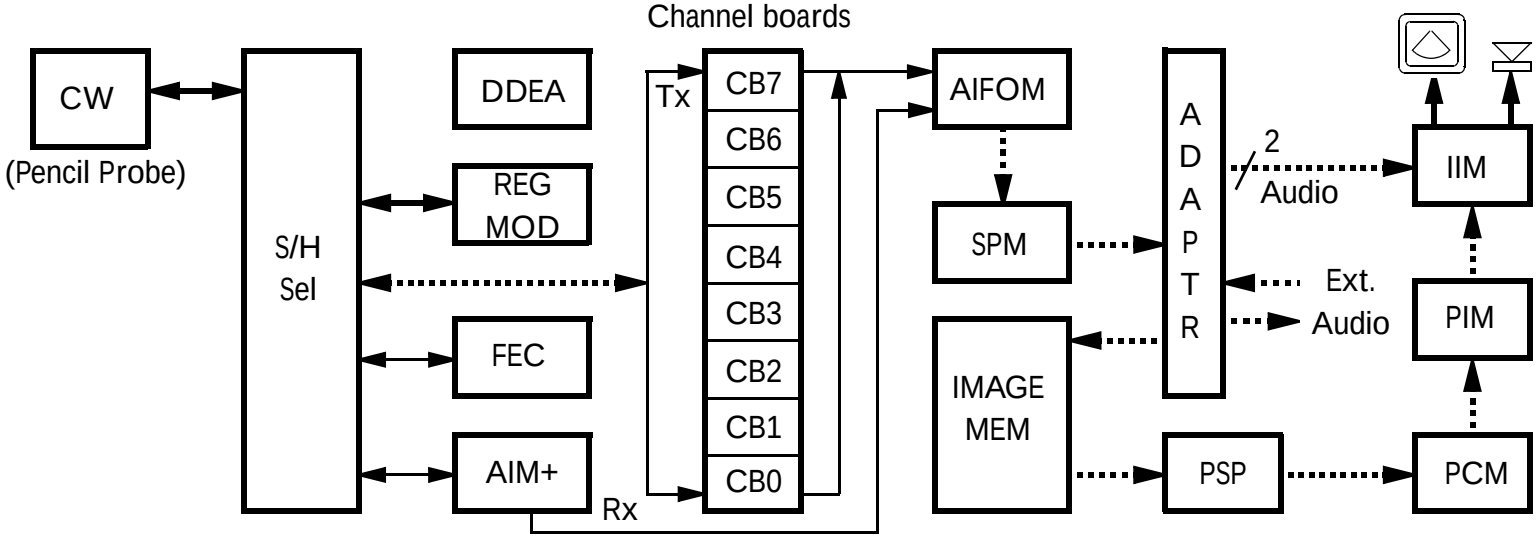


Figure 4-20 CW and Static PW Doppler (TCD) Signal Path (17X.XX Systems)

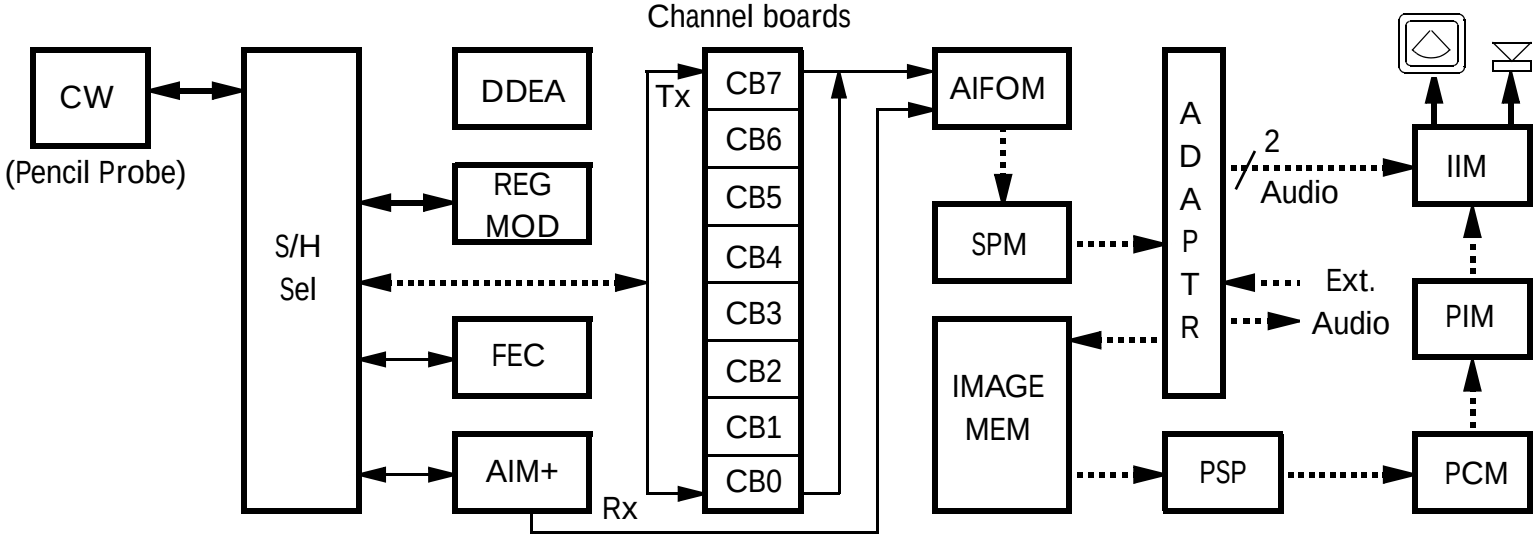


Figure 4-21 Static CW Front End Data Path

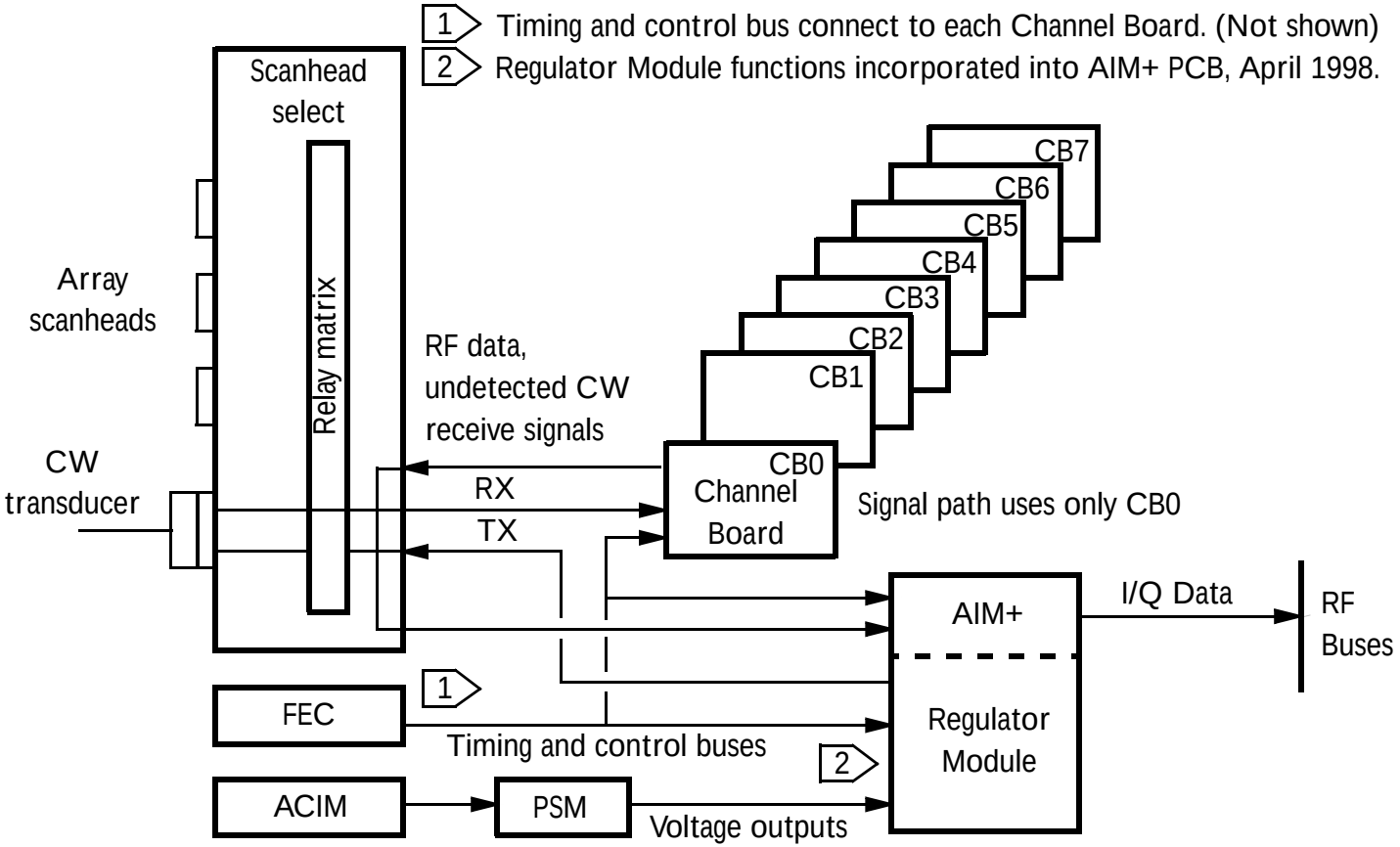


Figure 4-22 Steered CW Front End Signal Path

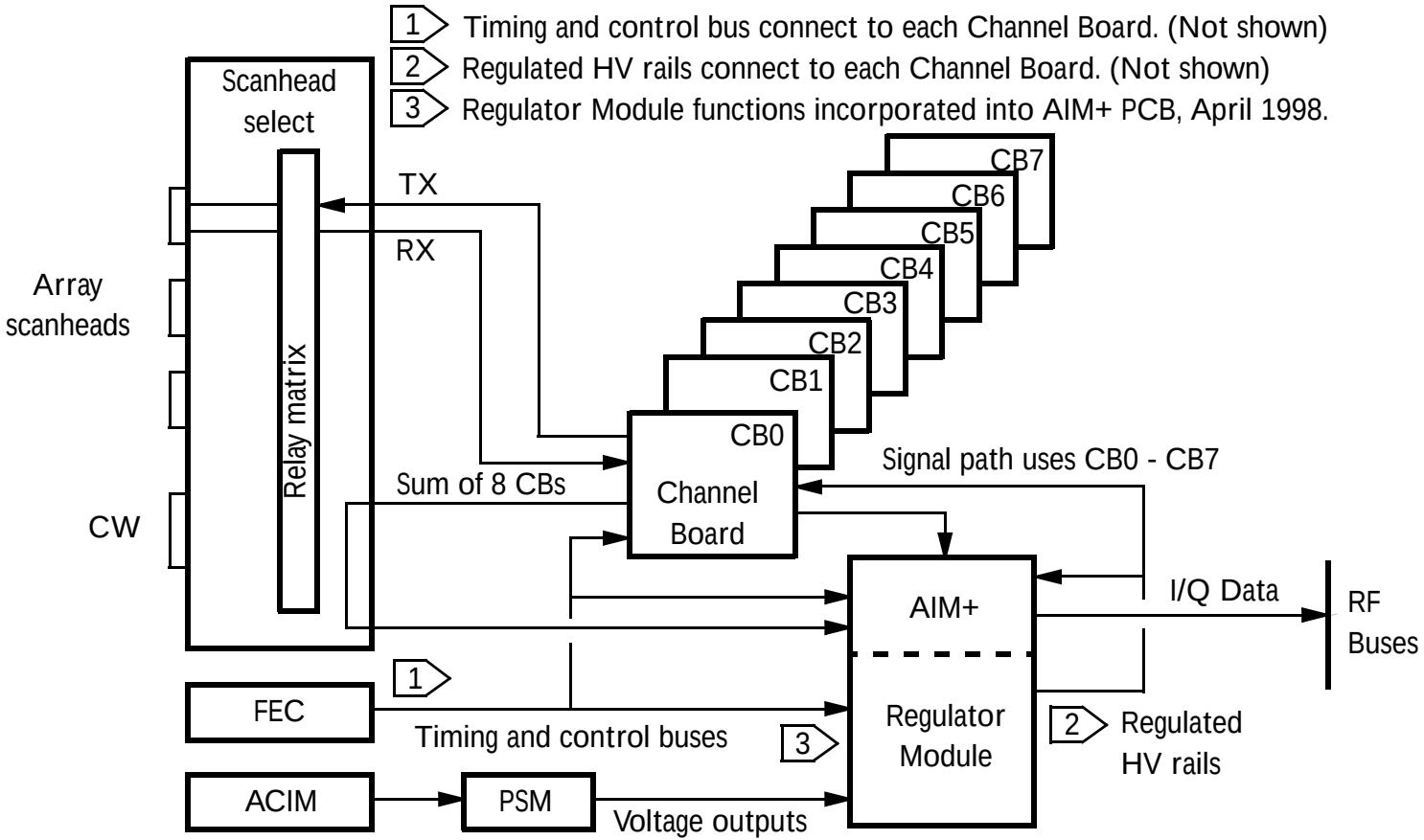


Figure 4-23 M-Mode Echo/M-Mode Color Data Path (127.XX Systems and Below)

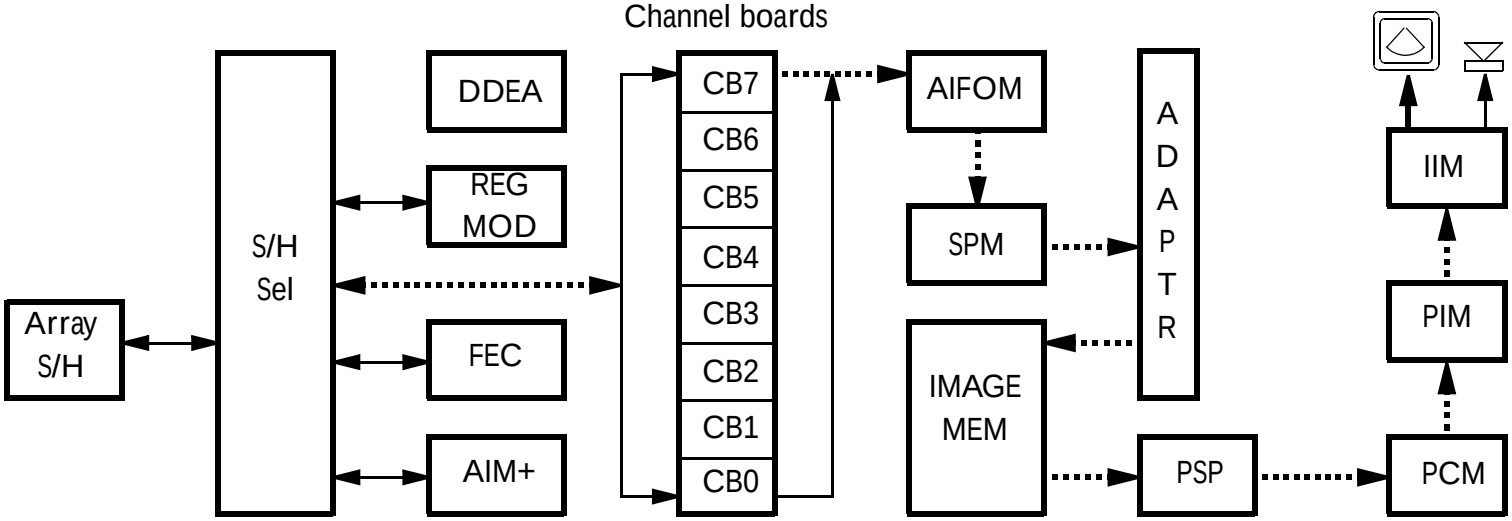
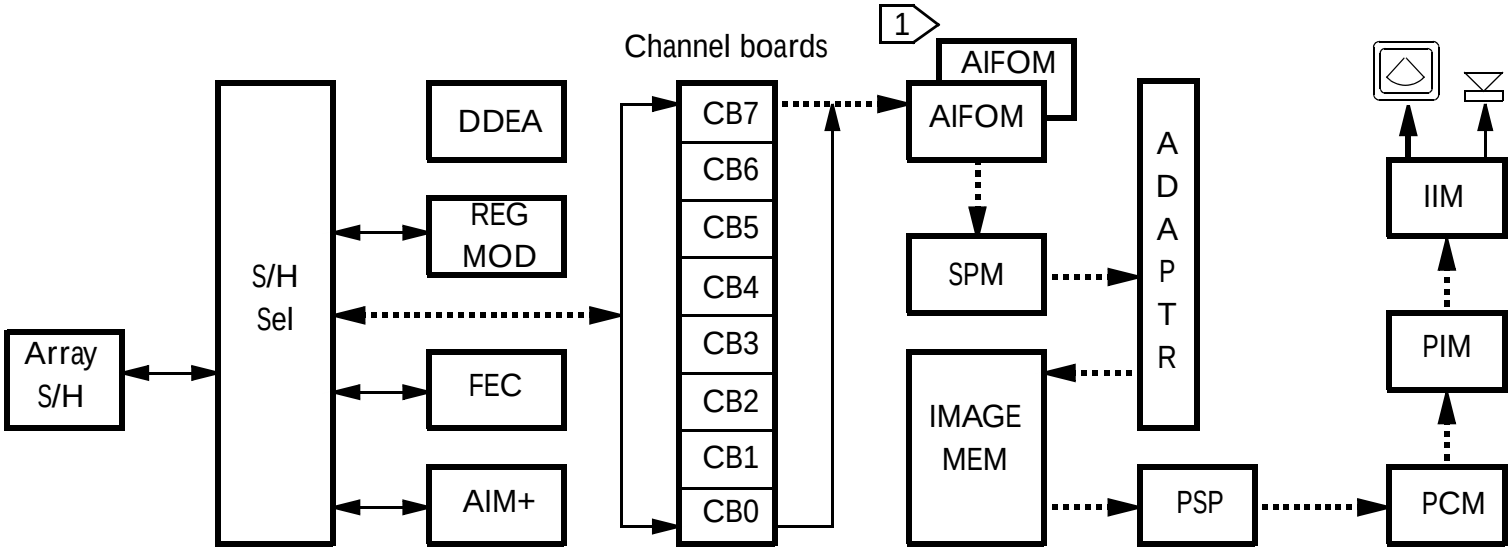


Figure 4-24 M-Mode Echo/M-Mode Color Data Path (17X.XX Systems)



1 Slave AIFOM not used for M-mode or color M-mode.

Figure 4-25 Internal VCR Signal Path

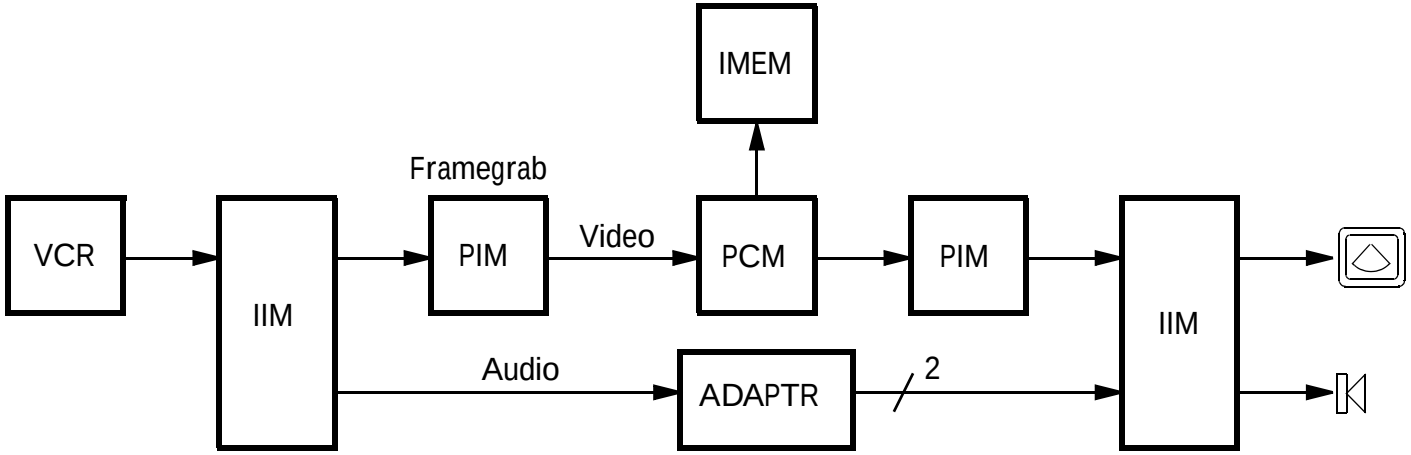


Figure 4-26 External VCR Signal Path

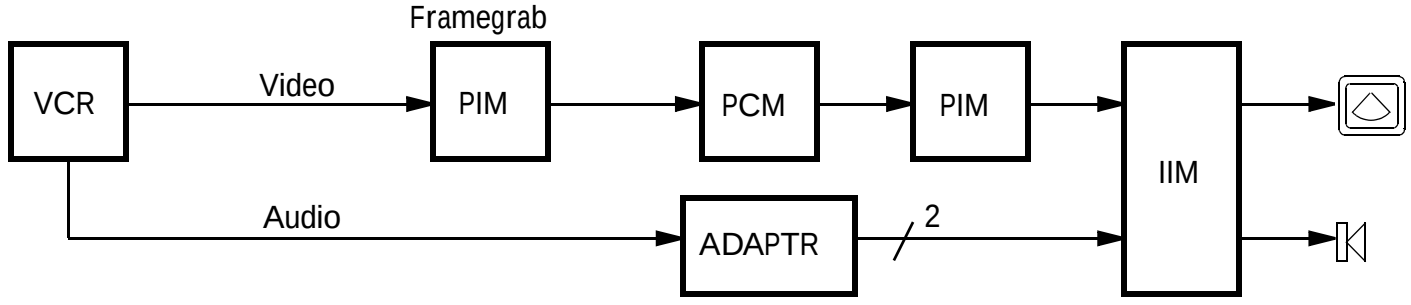


Figure 4-27 Power Monitor Block Diagram

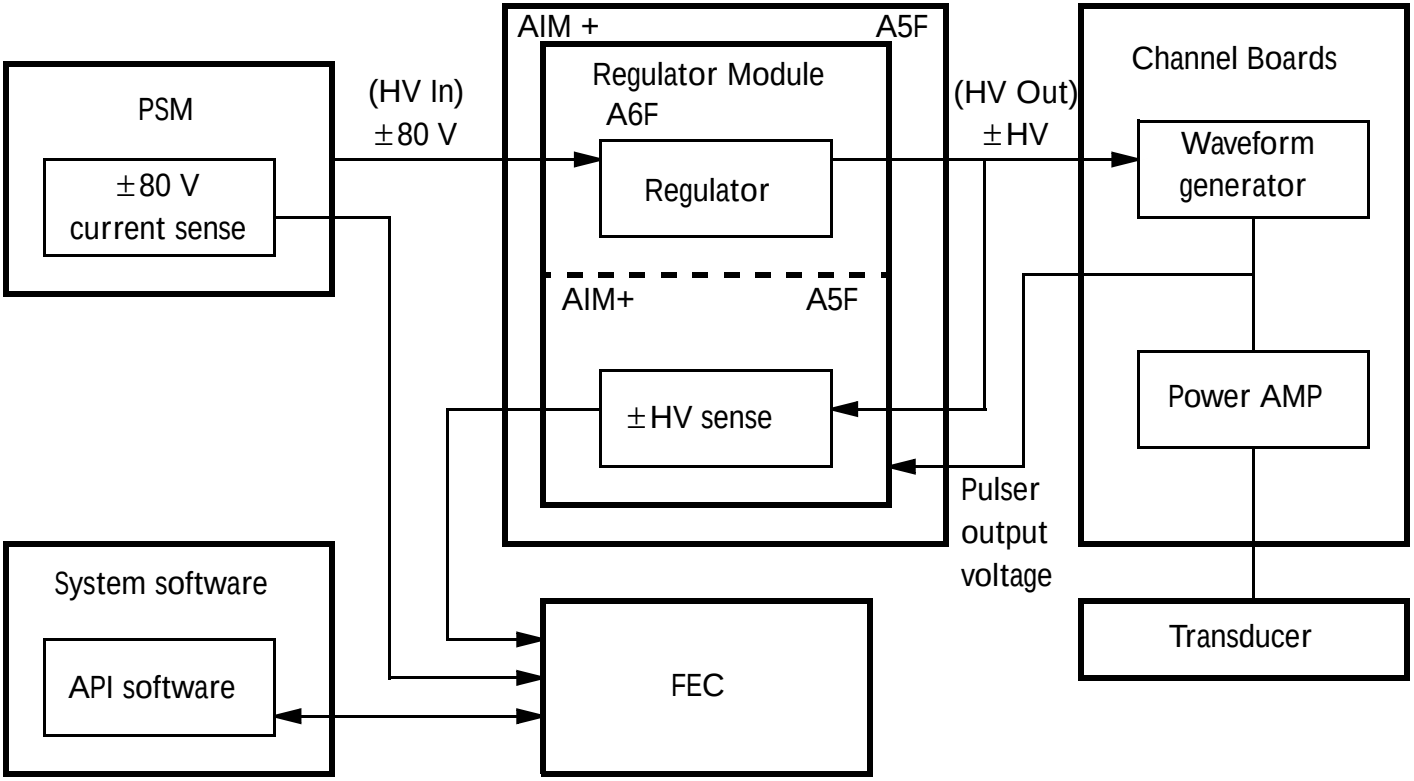


Figure 4-28 HDI 5000 System Functional Block Diagram

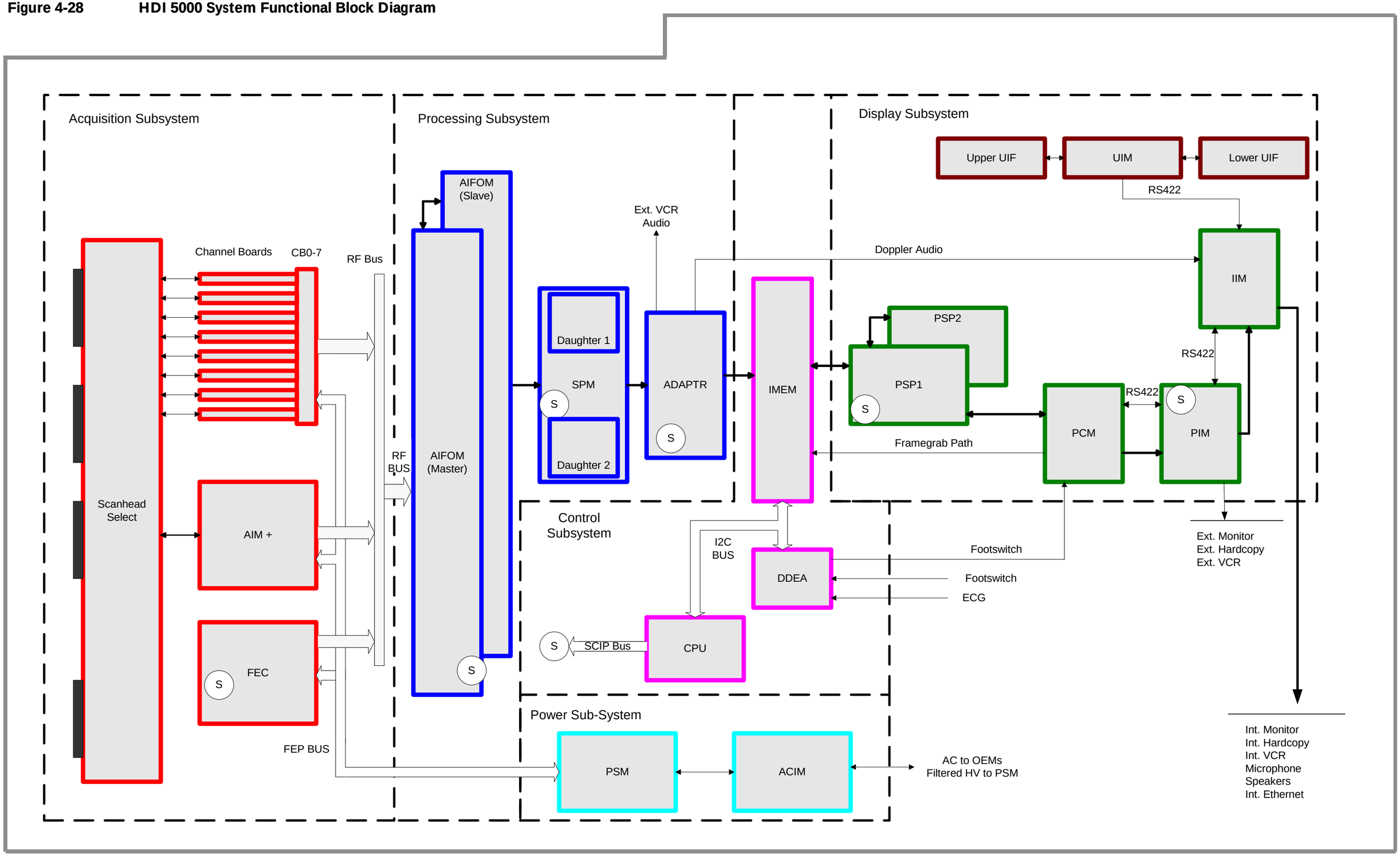


Figure 4-29 Acquisition Subsystem Block Diagram

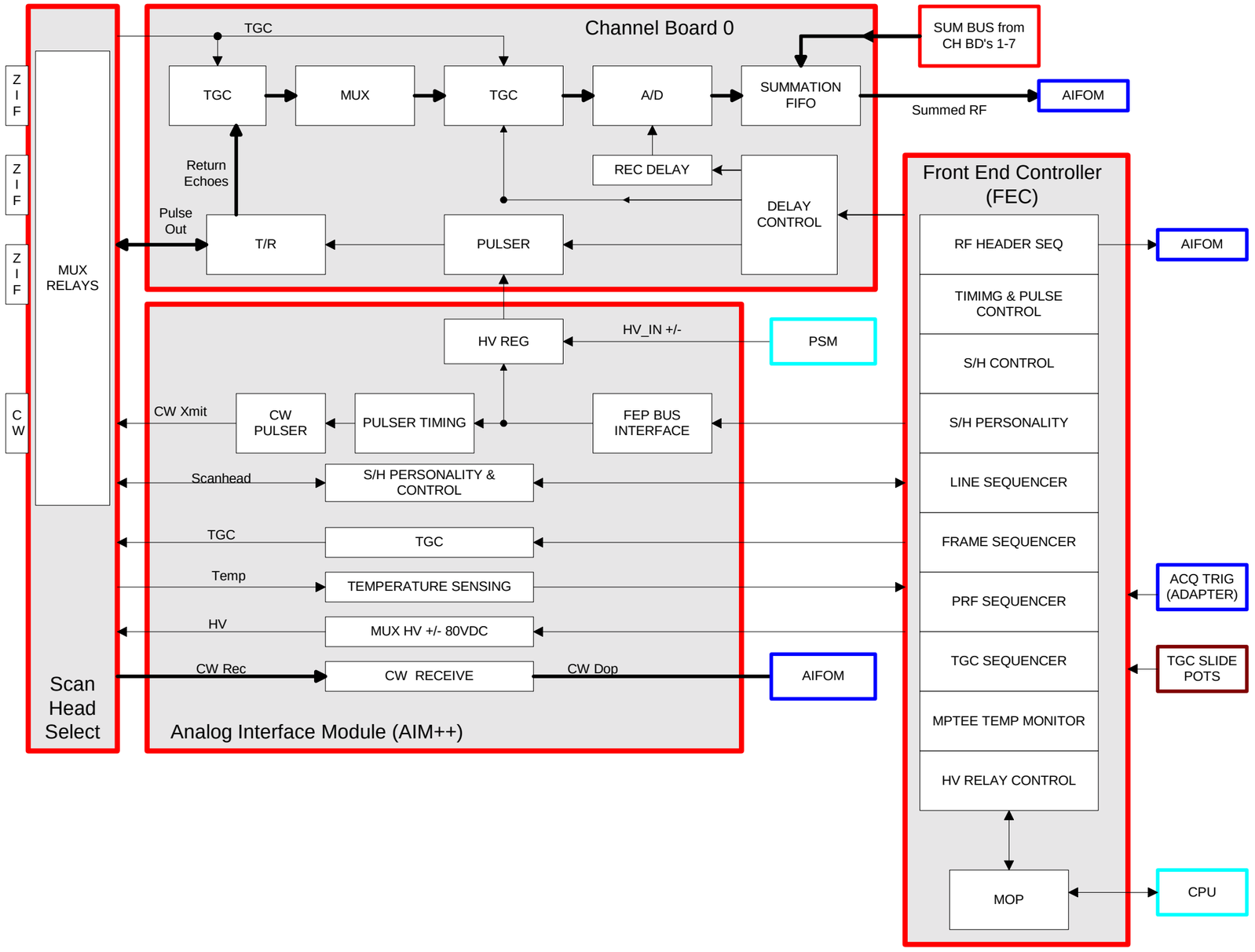


Figure 4-30 Processing Subsystem Block Diagram (17X.XX Systems)

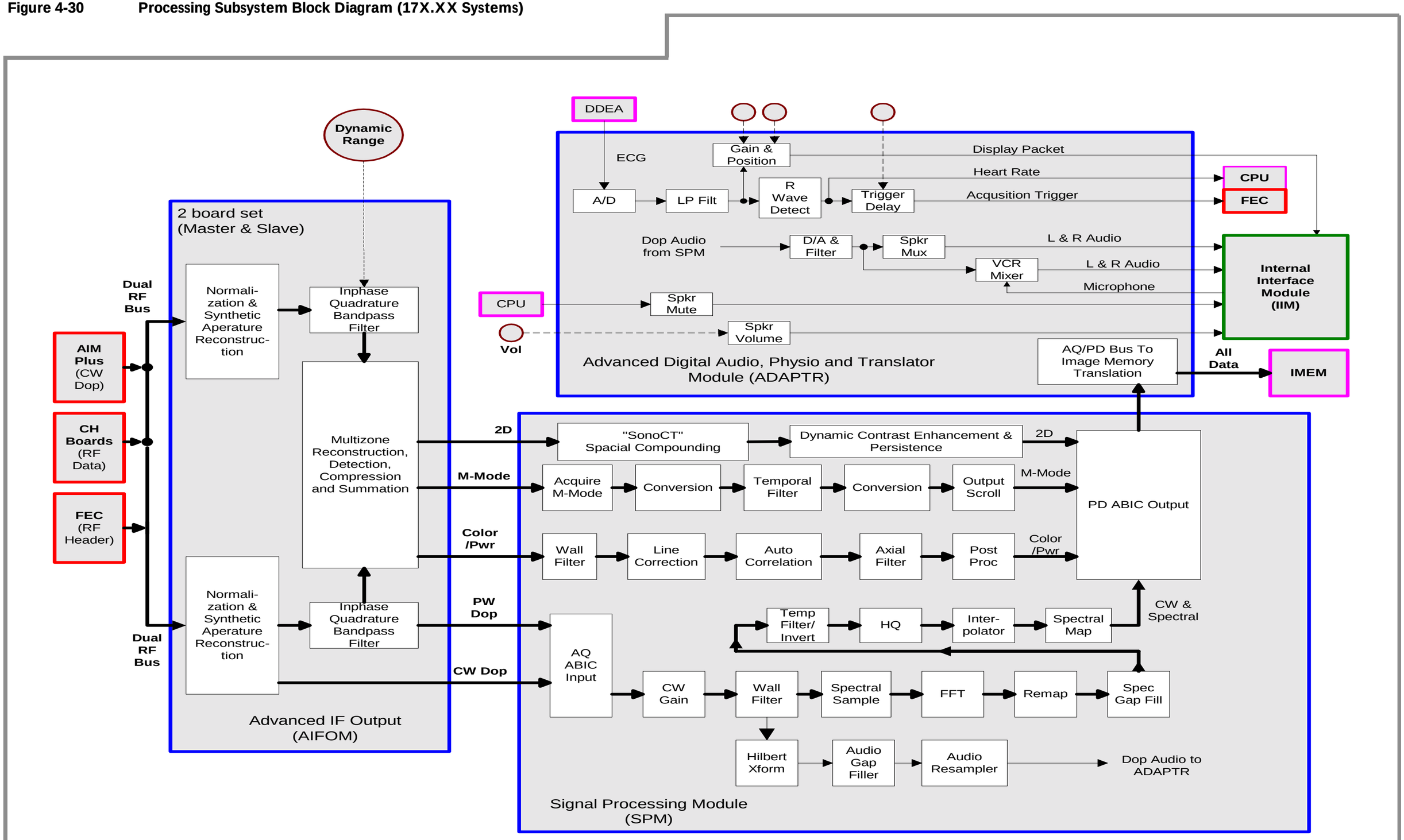


Figure 4-31 Display Subsystem Block Diagram

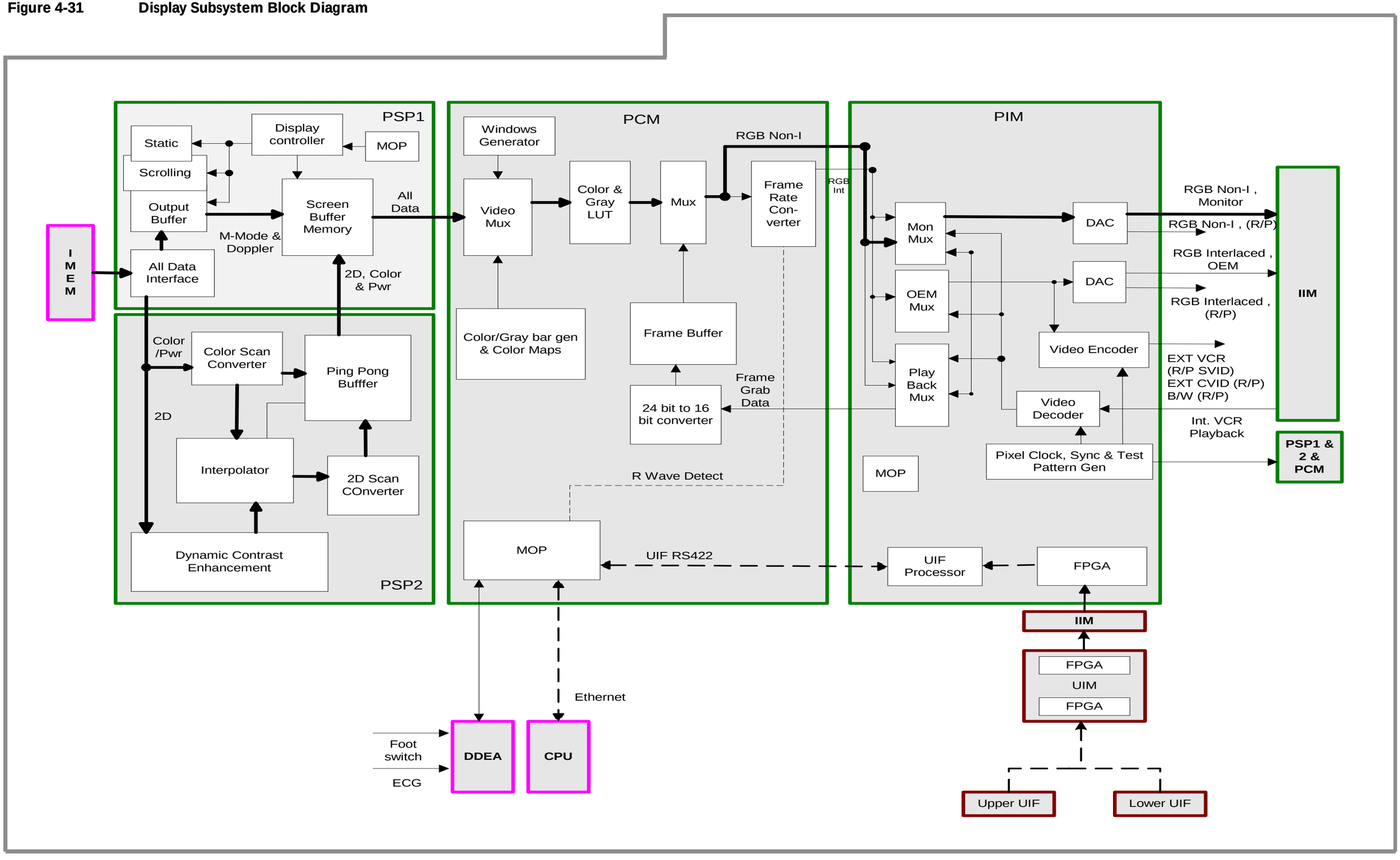


Figure 4-32 Channel Board Signal Path

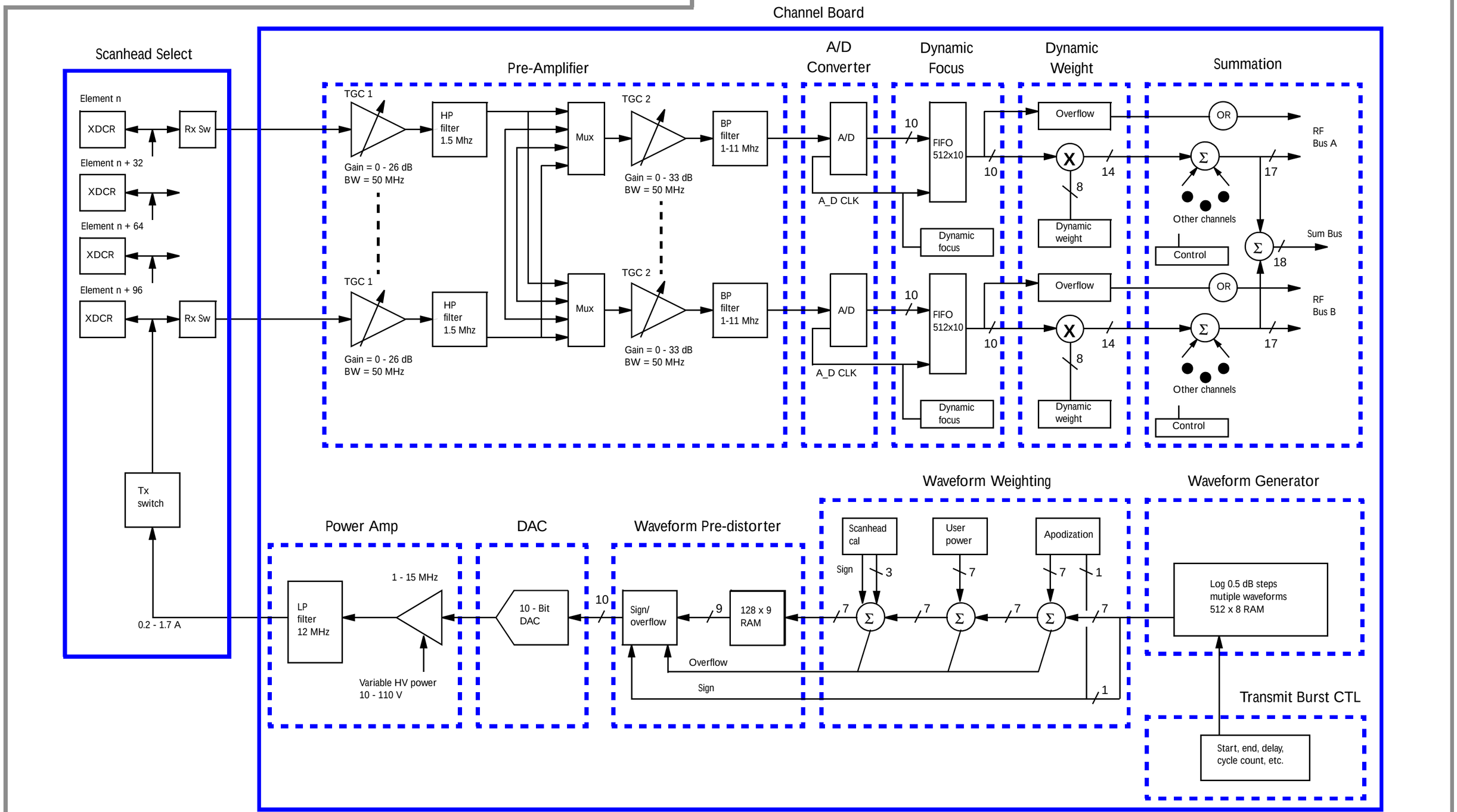
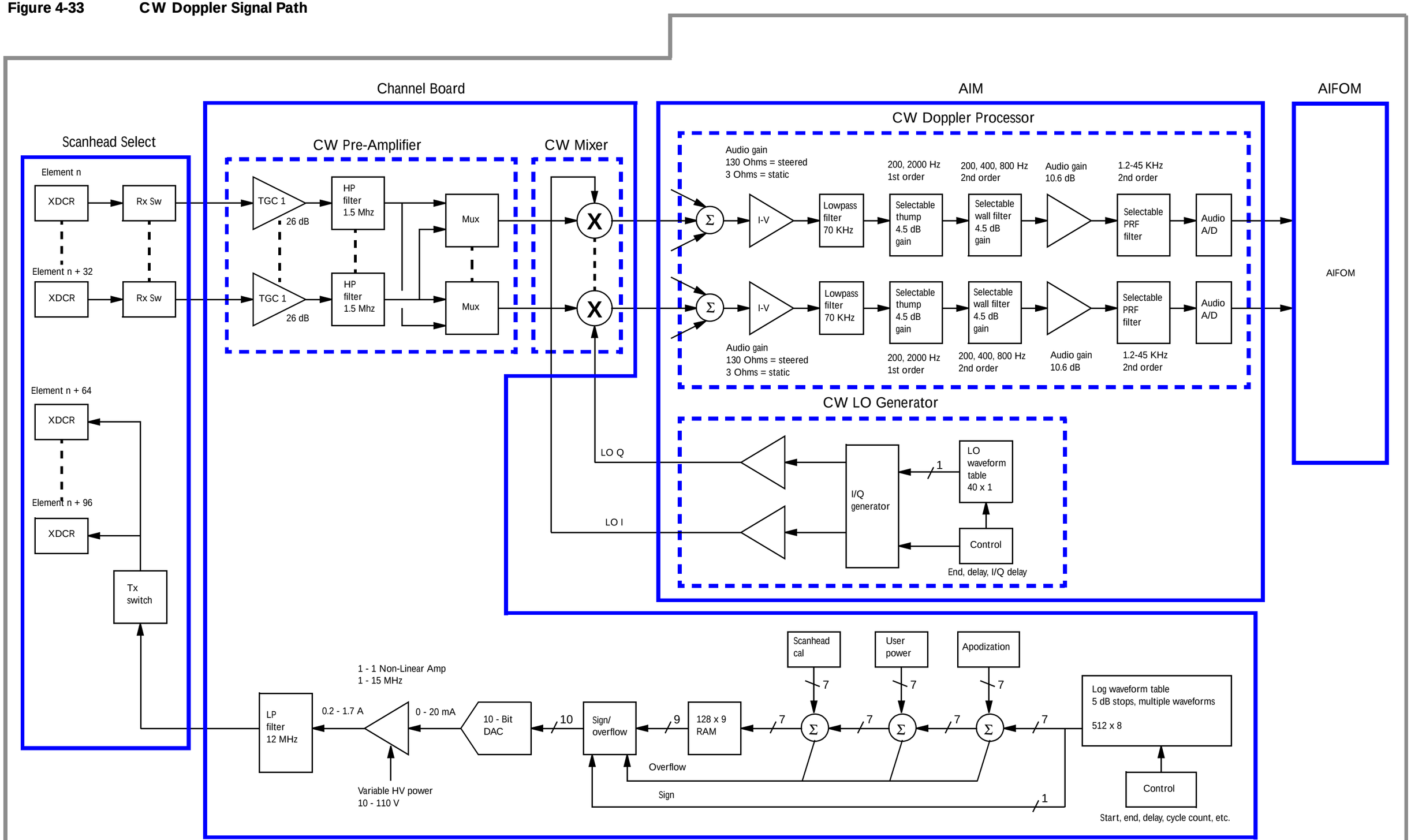


Figure 4-33 CW Doppler Signal Path



5 Installation

Installation Preparation

Introduction

The purpose of the pre-installation on-site evaluation (pre-site) is to ensure a trouble-free installation and to assist the customer in providing an environment that supports the reliable performance of the ultrasound system. These instructions are intended to guide you through a comprehensive inspection that ensures all physical, electrical, and environmental conditions are appropriate for optimal system operation.

Refer to the system specifications in Table 5-1 and Table 5-3 when evaluating the site.

Required Materials

- Tool Kit and Digital Voltmeter (DVM)
- Oscilloscope
- ONEAC Line Viewer
- Three-prong Test Plug (6005-0564-01)
- Fluke LAN Tester

Environmental Requirements

Verify the system is to be operated in a room that meets the environmental requirements listed in Table 5-1.

Table 5-1 Classic HDI 5000 System Specifications (Crated/Uncrated)

Parameter	Metric Value	U.S. Value
Height[1]	152/136 cm	60/53.6 in
Width	99.7/70.1 cm	39.3/27.6 in
Depth	113.7 / 97.2 cm	44.8/38.3 in
Weight with Peripherals[1]	200 kg	440 lbs
Fully Crated Shipping Weight (VCR separate)	295 kg	600 lbs
Ambient Operational Temperature[3]	16 to 40° C	61 to 104° F
Internal Operational Temperature[3]	16 to 55° C	61 to 131° F
Internal Operational Humidity	15 to 95% RH (non-condensing)	
Storage Temperature[4]	-35 to 65° C	-31 to 149° F
Storage Humidity	5 to 95% RH (non-condensing)	
Heat Output[5]	3,787.4 KJoules/ Hr at 1050W	3590 BTU/Hr at 1050W

1. Height with VCR is 152.0 cm (60 in); height with monitor removed is 106.7 cm (42 in); weight without monitor or peripherals is 172 kg (380 lb).

2.

3. Atmospheric pressure must be between 1013 hPa to 709 hPa (1.0 to 0.7 Atm).
4. Atmospheric pressure must be between 1013 hPa to 303 hPa (1.0 to 0.3 Atm).
5. Heat output at current draw listed in Table 5-3. Peripherals will increase heat load. Discuss with the facilities engineer the possible requirement for additional air circulation to handle the heat load from the system.

Table 5-2 Philips HDI 5000 System Specifications (Crated/Uncrated)

Parameter	Metric Value	U.S. Value
Height	146.1 cm	57.5 in
Width	73.4 cm	28.9 in
Depth	111.8 cm	44.0 in
Weight with Peripherals[1]	191-227 kg	420-500 lbs
Fully Crated Shipping Weight (VCR separate)	295 kg	600 lbs
Ambient Operational Temperature[3]	16 to 40° C	61 to 104° F
Internal Operational Temperature[3]	16 to 55° C	61 to 131° F
Internal Operational Humidity	15 to 95% RH (non-condensing)	
Storage Temperature[4]	-35 to 65° C	-31 to 149° F
Storage Humidity	5 to 95% RH (non-condensing)	
Heat Output[5]	4148 KJoules/ Hr at 1150W	3932 BTU/Hr at 1150W

1. Atmospheric pressure must be between 1013 hPa to 709 hPa (1.0 to 0.7 Atm).
2. Atmospheric pressure must be between 1013 hPa to 303 hPa (1.0 to 0.3 Atm).
3. Heat output at current draw listed in Table 5-3. Peripherals will increase heat load. Discuss with the facilities engineer the possible requirement for additional air circulation to handle the heat load from the system.

Electrical Power Requirements

WARNING

For safety and liability reasons, do not disassemble any power outlet or open any electrical panel. Have the facility representative confirm wiring compliance with the criteria specified below.

➤ To verify a dedicated/isolated line

1. Explain to the facilities representative that the system requires a dedicated and isolated line meeting the power requirements as listed in Table 5-3.
2. Verify the outlet to be used is a dedicated and isolated line:
   a. Have the facility representative open the circuit breaker.
   b. With a DVM or three-wire test plug, confirm that power is still applied to all other outlets and hard-wired devices in the immediate area and that power is removed only from the dedicated and isolated outlet box.
3. Verify the proper wiring of the outlet using a three-wire test plug. This plug also tests for the presence of a ground, but it cannot detect neutral/ground reversals.
4. Inform the facility representative of the current draw of the system and its acceptable voltage range. It is the responsibility of the facility representative to determine the proper size of the wire based upon the length of the feed.
5. Using your DVM at the outlet, measure the hot/neutral, hot/ground, and neutral/ground voltages with a comparable load (for example, another ultrasound system) on the line.
6. To determine line loss, if a facility representative is available:
   a. Have the facility representative measure the voltage at the line's circuit breaker primary in the distribution sub-panel.

b. Measure the voltage at the wall outlet.

c. Calculate the percentage of voltage loss across the line using the formula:

Percent line loss = [(A - B)/A] x 100

where A and B are the voltages at the circuit breaker and wall outlet with the system on, respectively.

d. Continue with step 8.

7. If a facility representative is not available:

a. Measure the voltage at the outlet with the load on and off.

b. Calculate the percentage of voltage loss across the line using the formula:

Percent line loss = [(A - B)/A] x 100

where A is the voltage at the wall outlet with the system off and B is the voltage at the wall outlet with the system on.

8. Use an ONEAC line viewer and oscilloscope to measure power-line noise. Repeat with a load applied, for example, another ultrasound system.

9. Record your power quality observations and measurements.

10. Review the electrical site evaluation with the facility representative.

Table 5-3 Power Specifications [1]

Measurement (System Only)	100 Vac, 50 Hz	120 Vac, 50 Hz 120 Vac, 60 Hz	230 Vac, 50 Hz 230 Vac, 60 Hz
Hot/Neutral	90 - 110 Vac	108-132 Vac	198-264 Vac
Current Draw (normal/peak)[1]	10.9/12.5 A	9.0/10.2 A	4.8/5.5A

Table 5-3 Power Specifications [1]

Power Draw (normal/peak)[1]	1100/1250 VA	1090/1225 VA	1105/1265 VA
	1070/1224 W	1060/1200 W	1050/1220 W
Power Dissipation (maximum/intermittent)[3]		1050/1300W	
Neutral-to-Ground		< 3-Vac RMS	
Line Loss		< 3%	
Distortion		< 20%	
Common Mode Noise		< 1.5 Vp-p	
Normal Mode Noise		< 10 Vp-p	

1. Power specifications updated for 10.5 systems with DVS.
2. Current draw and power draw specifications are for the rated voltage ranges. (The “normal” specification includes system operation with VCR recording, all other OEMs at the idle state, and with the system scanning. The “peak” specification includes system operation with OEMs.)
3. Peripherals will increase heat load. (The “maximum” specification includes the system and OEMs during continuous operation. The “intermittent” specification includes the system and OEMs during an intermittent duty cycle, such as a print cycle lasting a minute or less.)

Electrostatic Discharge

During normal system operation, the presence of electrostatic discharge (ESD) can cause system lock-ups and reliability problems.

CAUTION

With system covers or shields removed, ESD *will always* cause component damage. ESD damage is cumulative and may not be apparent at first, as indicated by a hard failure, but can cause degraded performance. Therefore, always use proper ESD handling procedures.

ESD can result from low humidity, carpeting, linen, and clothing. Avoid placing the system directly under or close to HVAC vents. While special equipment is required to measure ESD levels, you can determine the presence of ESD during the following steps.

1. Check for the presence of ESD by walking around where the system will be installed and touching grounded surfaces.
2. Ask the operators if they have experienced static discharge in the work area.
3. Suggest possible ESD minimizing devices and their usage, for example, static mats, humidifiers, and sprays.

Some facts about ESD:

- ESD voltages in excess of 2,000 V cause a shock.
- ESD is audible above 5,000 V.
- ESD is visible above 10,000 V.

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) typically cause image noise. EMI and RFI can be generated by a variety of electrical devices and may not be apparent until installation. The interference can be transmitted over power lines or radiated through the air.

- Use an AM radio tuned between stations around 1600 kHz as an EMI/RFI tester while walking around the room.

- Note any obvious or potential noise generators. Typical generating devices include (but are not limited to) gel warmers, coffee pots, air conditioners, fans, photocopiers, computers, printers, electric typewriters, lab equipment, surgical equipment, MRI units, elevators, radios, light dimmers, and refrigerators.

Dust

Air circulation requirements of the system and the location of its air filter can cause dust to accumulate rapidly on the air filter and cause the system to overheat. Advise the customer about the need to maintain a low level of dust in the room. Clean the fan filter, if necessary.

Lighting

Ambient light can interfere with the viewing of video monitors. A darkened room is preferred. Note if there are shades or blinds, small lamps, or dimmer switches in the room that can be used to control ambient light.

System Specifications

Wiring Requirements

The electrical feed to the system must be a dedicated and isolated line (no other equipment on the same line) with a third-wire ground. The ground wire must be an insulated; isolated solid copper conductor bonded to the ground bus of the service panel. The outlet must be a Hospital Grade Receptacle (for installations in North America) or an Isolated Ground Receptacle (International). Proper installation must reflect compliance with the national electrical code.

Image Management Network Requirements

The customer or their contractor will install the network cabling. If in-wall cabling is used, it is the customer's responsibility to install the correct type of cable in accordance with all applicable building and fire codes. It is also the customer's responsibility to maintain the in-wall cabling for the life of the system. The most common type of cable used is CAT5 (Category 5, 10 Base-T unshielded twisted pair).

Category 5 is the highest rating for network cabling.

➤ **Perform the following steps before installing the NetLink option**

1. Identify the system administrator (and backup person, if possible).
2. Obtain the following information from the system administrator:
   - A list of all equipment that is part of the Image Management network. Also include device type, model number, and software version applicable to each piece of equipment.
   - Logical diagram of the network showing topology, subnets, and so forth.
   - Locations of equipment.
   - Locations of all NetLink LAN attachment points.
   - Locations of power outlets and connector types.
   - Locations of any dedicated analog phone lines.
   - All necessary Internet Protocol (IP) addresses and subnet information.
3. Determine the type of network cabling installed.
4. Identify OEM equipment installers and contact them regarding the installation.
5. Check device compatibility prior to connecting new devices (such as, printers or archive devices) to the network.

Setup

1. Dispose of packing materials and clean up the unloading area.
2. Move the system to the installation location.
3. Verify proper wall outlet wiring and voltage levels with a three-prong test plug and a DVM.

WARNING

Do not plug the system in if a wiring fault is discovered. Advise the customer immediately and proceed only after the fault has been corrected.

4. Connect scanheads, peripheral cables, and the power cable.

5. Set the monitor brightness control to 20 and contrast to 80.
6. Verify the system fans are operating.
7. Verify proper system operation with the procedures in “Performance Tests” on page 151.

VCR Control Settings

NOTE To ensure proper system operation, turn on all OEMs prior to checking system functionality.

Panasonic AGMD830P VCR

The VCR can be programmed using the on-screen programming menu or the VCR front panel display screen. To use the VCR’s front panel screen, refer to the OEM manual.

1. Press Setups and select Peripherals, Internal VCR, and Panasonic MD830. Select Close at the bottom of the display.
2. Set the MENU switch on the VCR to SET. Set the MODE LOCK switch to OFF (Table 5-4).
3. Press Superkey and Video simultaneously to toggle through the on-screen menus (internal VCR, internal color printer, and so forth). The VCR menu lists on-screen menu items from Table 5-5.
4. Verify the VCR parameter settings. Refer to Table 5-6 for VCR front panel control functions while in programming mode.
5. Press Setups and change the VCR configuration to SVHS to return to normal configuration.
6. Set VCR Menu switch to OFF.

Table 5-4 VCR Programming Control Settings

Parameter	Setting
Audio Out	Mix
Audio Out	Normal
Input	S-Video
S-VHS	Auto
Menu	Set (During programming) Off (During normal operation)
Mode Lock	Off

Table 5-5 Panasonic AGMD830P NTSC/PAL 120 V VCR Setup

Parameter	Setting
Tilt Down Panel	
MODE LOCK	OFF
MENU	SET
On Screen Menu	
VISS	Off
Tape Select	T-120 (NTSC) or E-180 (PAL)
Auto Back	On
Tape In Mode	Stop
Tape End Mode	Stop

Table 5-5 Panasonic AGMD830P NTSC/PAL 120 V VCR Setup (Continued)

Parameter	Setting
REC Tape End	Stop
STBY Off Time	5 Min
Bit Length	8 Bit
Stop Bit	Stop-1
Parity	None
Baud Rate	9600
Hour Meter	XXXX Hr
HI-FI REC	On
Audio Dub	CH1
Edit (NTSC only)	Off
YC Filter (NTSC only)	Off
Notch (PAL only)	Off

Table 5-6 VCR Programming Control Functions

VCR Control	Programming Operation
Stop	Moves the selection item cursor forward
Rewind	Moves the selection item cursor backward
Play	Returns to the previous menu page
Record	Advances to the next menu page

Table 5-6 VCR Programming Control Functions

VCR Control	Programming Operation
Fast Forward	Moves the menu selection to the item below
Inside Search Dial	Moves the menu selection to the item above or below

Printer Control Settings

For printers that use on-screen programming, use the following procedure to setup the printer menus.

1. Press Menu on the printer front panel.
2. Press Superkey and Video simultaneously to toggle through the on-screen menus.
3. Set the printer control settings as specified in the printer setup tables below (Table 5-7 through Table 5-17).
4. Set the menu switch to OFF.

Table 5-7 Sony UP-5250 Color Video Printer Setup (Early Model)

Parameter	Setting
Sony UP-5250 early model used for HDI 3000 systems upgraded to HDI 5000 systems only	
Menu 1	
Print QTY	001
Multi Pix	1
Separate	****
Input SEL	RGB

Table 5-7 Sony UP-5250 Color Video Printer Setup (Early Model) (Continued)

Parameter	Setting
FRM/FLD	Frame
Sharpness	M
Menu 2 (Color Adjust)	
Display	Full
Preset	1
Red	0
Green	0
Blue	0
Dark	-1
Light	1
Select SETUP menu to verify the following settings	
Size	Wide
H Shift	0
V Shift	0
Monitor	E To E
Display	On
Remote 2	M & Print
Baud Rate	Not Used
LCD CONTR	0

Table 5-8 Sony UP-5250MD Color Video Printer Setup

Parameter	Setting
Front Panel	
Manual/Auto	Manual
Gain	Center detent
Color	Center detent
Source/Memory	S
Memory Page	1A1B
Rear Panel	
RGB/R-Y/Y/B-Y	RGB
RGB 75Ω Termination	ON
NTSC 75Ω Termination	ON
Monitor RGB	Center detent
Menu 1	
Print Quantity	001
Multi Pix	1
Separate	Asterisks show if 1 is selected for Multi Pix, otherwise set this feature to OFF.
Input SEL	R Appears as RGB when selected.
FRM/FLD	Frame
Sharpness	M

Table 5-8 Sony UP-5250MD Color Video Printer Setup (Continued)

Parameter	Setting
Menu 2	
Display	Full
Preset	1
Red	-1
Green	0
Select SETUP menu to verify the following settings:	
Size	Wide
H Shift	6 Dots Right (or adjust image for best fit to Print out)
V Shift	0 Lines (or adjust image for best fit to print out)
Monitor	E To E
Display	On
Remote 2	M & Print
Baud Rate	Not Used
LCD CONTR	0
Blue	0
Dark	+1
Light	0

Table 5-9 Sony UP-5600 Color Video Printer Setup

Parameter	Setting
Color Adjustment Setup Menu	
Preset	1
Red C-R	R5
Green M-G	G5
Blue Y-B	B5
Dark	-5
Light	+5
Save	1
Analog Setup Menu	
Hue (NTSC only)	0
Color	0
Gain	0
AGC	OFF
Moni C-R	0
Moni M-G	0
Moni Y-B	0
System Setup Menu	
Display	ON
Beep	ON

Table 5-9 Sony UP-5600 Color Video Printer Setup (Continued)

Parameter	Setting
LCD	ON
LCD-CNTR	0
Baud Rate	9600
Monitor	EE
User Set	1
Print Setup	
H-Shift	-24 Dots (NTSC) -16 Dots (PAL)
V-Shift	-8 Lines (NTSC) -10 Lines (PAL)
H-Size	952 Dots (NTSC) 924 Dots (PAL)
V-Size	480 Lines (NTSC) 576 Lines (PAL)
Setups	
Separate	ON
Dup-Image	OFF
Sharpness	+4
System Function Menu	

Table 5-9 Sony UP-5600 Color Video Printer Setup (Continued)

Parameter	Setting
Remote2	C&Print
Remote3A	Print (Does not matter. Used only with Sony footswitch)
Remote3B	Back-Sp (Does not matter. Used only with Sony footswitch)
Remote3C	CAP/SRC (Does not matter. Used only with Sony footswitch)
Remote3E	Capture
Clear	Part
Capture	Single
Timer	OFF
Control Panel Button Setups	
Motion Correct	OFF
Input Select	RGB
Multi-Picture	1
Print QTY	1
User Preset	1
Display P in P	OFF
Caption ON/OFF	OFF
Rear Panel Switches	

Table 5-9 Sony UP-5600 Color Video Printer Setup (Continued)

Parameter	Setting
R/G/B/Sync 75 Ohm	ON
S-Video 75 Ohm	OFF
NTSC/PAL	Set to appropriate video format

Table 5-10 Mitsubishi CP700 Color Video Printer Setup

Parameter	Setting
Color Adj	
BRT	0
CONT	-8
R-Sub	0
B-Sub	0
Center	OFF
Analog Adj	
BRT	0
CONT	0
R-Sub	0
B-Sub	0
Center	OFF

Table 5-10 Mitsubishi CP700 Color Video Printer Setup (Continued)

Parameter	Setting
Signal Set	
Input	RGB
Field	Normal
AFC	OFF
Additional	
Strobe	OFF
Multi: 1 for 1	OFF
Print	
Mode	L (large)
Grad	ECHO
APT	H1
Comment	OFF
Mirror	OFF
System	
Size	USER
H-Posi	0
Copy	OFF
Top	-8
Bottom	10

Table 5-10 Mitsubishi CP700 Color Video Printer Setup (Continued)

Parameter	Setting
Left	-16
Right	6
Page Inc	ON
Live Sel	DIGITAL
Convert	ON
Buzzer	ON
Rear Panel Switch Settings	
IMPEDANCE - RGB	75 Ω
IMPEDANCE - SYNC	HIGH

Table 5-11 Mitsubishi CP700 Color Video Printer Memory SW Menu Control Settings

Parameter	Setting
Time	
Month	Not used with ultrasound systems.
Date	
Year	
Hour	
Minute	
Second	

Table 5-11 Mitsubishi CP700 Color Video Printer Memory SW Menu Control Settings (Continued)

Parameter	Setting
Key Set	
KEY LOCK	OFF
MEM&PRN	ON
MEM&STOP	OFF
MEM&MON	OFF
PRINT&CLR	OFF
CLEAR KEY	ONE
Signal Set	
IN Sync	0.3 V
OUT Sync	0.3 V
Sync	NEGA
RGB SOG OUT	OFF
H Start	NORMAL
Spcl Timing	OFF
MON R-Sub	0
MON B-Sub	0
Print Set	
PRN DIR	NORMAL
PRN Speed	NORMAL

Table 5-11 Mitsubishi CP700 Color Video Printer Memory SW Menu Control Settings (Continued)

Parameter	Setting
Margin Cut	OFF
V Position	34
Echo Gamma Adj.	a: (64, 0) b: (128, 0) c: (192, 0)
System Setting	
PRG All Init	OFF
Baud Rate	9600
Command Type	A
Response	RETURN
Remote Busy	H

Table 5-12 Mitsubishi CP800 Color Video Printer Setup

Parameter	Setting
Color Adj	
BRT	+5
CONT	0
R-Sub	0

Table 5-12 Mitsubishi CP800 Color Video Printer Setup (Continued)

Parameter	Setting
B-Sub	0
Center	0
Analog Adj	
Color	N/A
Tint	N/A
BRT	0
CONT	0
R-Sub	0
B-Sub	0
Center	OFF
Input	
Input	RGB
Additional	
Multi	OFF
Buzzer	T1
Print	
Mode	AUTO
Grad	ECHO
GAMMA ADJ	

Table 5-12 Mitsubishi CP800 Color Video Printer Setup (Continued)

Parameter	Setting
Low Point	64
Mid Point	128
Hi Point	192
Apt	N
Com	OFF
Mirror	OFF
Comment	[>}
SIZE/TIMING	
H-Posi	0
H-Start	NOR
Size	W

Table 5-13 Mitsubishi CP800 Color Video Printer Memory SW Menu Control Settings

Parameter	Setting
Key Set	
KEY LOCK	OFF
MEM&PRN	ON
MEM&STOP	OFF
MEM&MON	OFF

Table 5-13 Mitsubishi CP800 Color Video Printer Memory SW Menu Control Settings (Continued)

Parameter	Setting
PRINT&CLR	OFF
Clear Key	PAGE
Keep Moni	OFF
Signal Set1	
Field	NORMAL
AFC	OFF
Sync	EXT
R-Sub	0
B-Sub	0
Signal Set2	
IN Sync	0.3 V
OUT Sync	0.3 V
Sync	NEGA
RGB SOG OUT	OFF
Spcl Timing	OFF
Print Set	
DIR	NORMAL
Margin Cut	OFF
Auto Cut	ON

Table 5-13 Mitsubishi CP800 Color Video Printer Memory SW Menu Control Settings (Continued)

Parameter	Setting
OP Mode	4P
System Setting	
Page Inc	ON
Live Select	DIGITAL
Convert	ON
Remaining	OFF
Remote Set	
Baud Rate	9600
Command Type	A
Response	RETURN
Busy Level	H
Busy Mode	PRN
V Sync Mem	OFF
Previous Error	
Mecha Error	NOTHING
PRG All Init	OFF
Rear Panel Switch Settings	
IMPEDANCE - RGB	75 Ω
IMPEDANCE - SYNC	75 Ω

Table 5-14 Sony UP1850 Color Video Printer Setup

Parameter	Setting
Sony UP1850 used for upgraded HDI 3000 systems only	
Menu 1	
Print QTY	1
Input Sel	RGB
FRM/FLD	FRAME
Sharpness	0
Color Adjust	
Load	1
Red	0
Green	0
Blue	0
Dark	+1
Light	-2
Check	N/A
Save	1
Signal Adjust	
Color	0
Gain	0
Offset	0

Table 5-14 Sony UP1850 Color Video Printer Setup (Continued)

Parameter	Setting
AGC	OFF
Multiplex	
Split Mem	OFF
Interval	OFF
Separate	OFF
DUP Image	OFF
Image Size	L
Mirror	OFF
Pick Image	N/A
Set Up	
H Shift	0 DOT
V Shift	0 DOT
RM2 Mode	M&P
RM2 ACT	1ACT
LIVE MODE	OFF
Monitor Adjust	
Moni Red	0
Moni Blue	0
Display	OFF

Table 5-14 Sony UP1850 Color Video Printer Setup (Continued)

Parameter	Setting
Monitor	E to E
Sync on G	OFF
Rear Panel Dip Switches	
75 OHM	ON
SW1	ON
SW2 - SW8	OFF

Table 5-15 Sony UP860/870 Video Printers

Parameter	Setting
Sony UP860/870 used for upgraded HDI 3000 systems only	
Front Panel	
Contrast	Center
Brightness	Center
Thru/EE Switch	Thru
Posi/Neg Switch	Posi
Rear Panel	
Dip Switches	All ON, except switch 1 OFF
I II III Switch	II
D Adj	Center

Table 5-16 Sony UP890 Video Printer

Parameter	Setting
Front Panel	
Print Size	NORMAL
Contrast	10:00
Brightness	11:30
Thru/EE Switch	EE
STD/SIDE	STD
Rear Panel	
Dip Switches	All ON
GAMMA	II
Paper Type	IV

Table 5-17 Sony UP910 Video Printer

Parameter	Setting
Front Panel	
Dip Switches, NTSC	All OFF
Dip Switches, PAL	All OFF, except switch 5 ON
Contrast	Center
Brightness	Center

Table 5-17 Sony UP910 Video Printer (Continued)

Parameter	Setting
Rear Panel	
75 Ohm	ON

Table 5-18 Aspect Multi-Image Camera

Parameter	Setting
Brightness	35
Contrast	45
Polarity	+

Table 5-19 System Setups for Video Printers and Aspect MIC

Parameter	Setting
Use Print Button To	Print Local (Internal)
Environment	Print All
Print Color Images to B&W Printer	Yes
Store to Optical Disk During Exam	OFF

Image Optimization

Image optimization on the HDI 5000 system uses different settings than those used on other Philips Ultrasound systems. Set the system to the following settings for optimum image quality.

- Monitor brightness to 20 and contrast to 80. (Higher brightness levels produce flat images.)
- TGC slidepots in a straight line. Then, adjust as necessary for patient habitus. Set slidepots before setting a new TSI.

- Compression curve to C2. Lowering compression decreases image noise. You may need to increase compression for THI images.
- Gray Maps as required by customer. (Dedicated gray maps exist for General Imaging and Cardiac Imaging.)
- Power as required. (Reduce to decrease artifacts.)

NetLink Installation

NetLink is installed by programming the HDI 5000 host table with the proper network configuration. The following steps summarize the installation process:

1. Determine configuration information: all IP addresses, model IDs, subnet masks, gateway addresses, port numbers, and device aliases. Obtain the information from the network administrator.
2. Use the configuration information to program the host table using the ultrasound system to edit, install, and copy the configuration files. Refer to the *Reference Manual*.
3. Verify the accuracy of the syntax of these files by selecting the Save option from the bottom of the display. If there are no errors, then the files are syntactically correct; otherwise, they are not, and the problem is described in an error message. Edit the files, fix the syntax, and apply until no errors occur.
4. Use the Image Management Network Configuration setups to verify the network configuration (host table, device table, and device files). From the Printer Selection option, verify the printers are displayed in the appropriate lists on the B/W and Color Printer setups panels. Verify the ultrasound system appears in the Ultrasound System Net ID and that all of the archive devices appear in the archive list.
5. Select Image Management Configuration Files and create a backup copy of the configuration files on the system hard disk.

6. Select the correct printer and archive devices using Printer Selection and Network Configuration. Refer to Section 6, “Performance Tests”, to create an exam, take several images, and end the exam. Verify the images are printed and the exam appears on all archive devices.
7. If devices are to be added to the device table after the original network installation, load the site disk obtained from TSG and copy the new configuration files.
8. Backup the network configuration files after upgrades or modifications to the host or device tables.

Detailed instructions for installing NetLink are contained in the “Image Management” section of the *HDI 5000 Reference Manual,* part number 4703-0027-XX.

Host Table, Device Table, and Device Files

The host table must contain the correct alias, IP address, port number, model ID, title, and subnet for each device on the network. The device table maps each model ID in the host table to a file that describes the capability of that device. These capabilities include such things as printer type, film size, film type, orientation, destination, density, and so forth.

NOTE Communications errors will result from improper IP address syntax. Enter IP addresses with leading zeroes exactly as specified by the customer’s IP addresses. For example, if the customer’s IP addresses are listed as 192.168.001.100, you would use the laptop address as 192.168.001.101.

Most of the attributes or capabilities listed in the printer device file appear as setups on the Image Management Net Admin: B/W Printers and Color Printers system setups screens. From these screens you can select the settings for the desired print attributes. You must first select a printer type before setting the other print attributes.

The information in the host table, device table, and device files establishes the network configuration. This information must be consistent, or an error message will be displayed on the system monitor when the configuration files are saved.

The host table, device table, and device files establish the following relationships and must be setup to reflect the network configuration:

- TCP/IP addressing for server and clients on the network
- DICOM print connections
- Print media selection
- Print media size selection
- Print film type selection
- Print orientation selection
- Print contrast and density settings
- Print format

Once the network configuration has been established and setup, create a site disk by copying the host table, device table, and device files.

6 Performance Tests

Introduction

This section contains a series of performance tests to be performed on the system following installation, upgrade, or repair. The purpose of these tests is to verify the correct operation of the system (hardware and firmware). The checklist included at the end of this section can be used to ensure that all tests are performed.

The major test sections in this procedure are organized to follow a logical progression through each of the major system modes. It is not a requirement to perform the sections in any particular order. However, it is best to perform the tests in their written order to promote a thorough and consistent testing process.

WARNINGS

- Measurement accuracy must be verified after installation, after every repair involving PCB or power supply module replacement, and during every preventive maintenance inspection. If measurements are inaccurate, misdiagnosis may result in harm to patients.
- Wrist straps should *not* be worn when working on a system with its power turned on. The +5 Vdc supply is a very-high current supply. Use caution when troubleshooting.

NOTE Before performing these tests, the site power should be inspected in accordance with the pre-site inspection procedures detailed in the “Site Inspection” section of the *General Field Service Manual*.

Test Equipment and Materials

- FSE Tool Kit (193-90003-01)
- RMI Model 413 Tissue Equivalent Phantom (199-12204-00)
- RMI Model 406 Dual Attenuation Phantom (2100-1610-01)
- Leakage Tester/ECG Simulator (6005-0555-01)

Initial Setup

WARNING

The following series of tests require applying power to the system while protective covers are removed. Dangerous voltages are present. Use extreme caution.

The initial setup procedure consists of observing system power-up and initialization, verifying system configuration against the customer order acknowledgement (COA), and adjusting the monitor for optimal viewing.

System Power Up and Initialization

This section verifies the status of system power supply voltages as reported by the power supply boards.

NOTE Before proceeding, refer to Section 3, “Safety”, and “Power Subsystem” on page 63, and review the discussion of the three power states (Off, Standby, and On).

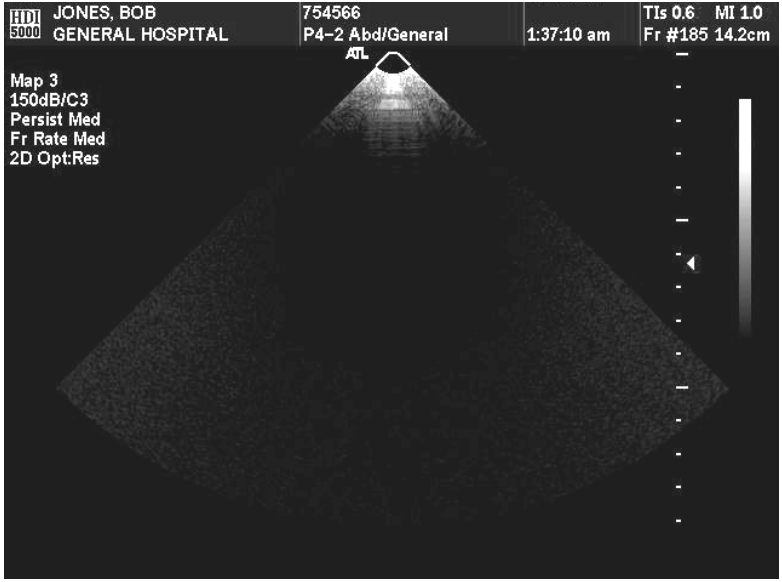
1. Turn system off and disconnect power cord before proceeding.
2. Perform the system electrical inspection as described in Section 5, “Installation”.
3. Connect an array scanhead to the system.
4. Turn on all OEMs prior to checking system functionality.
5. Load OEM paper or film, as required.

6. Connect the system power cord to a hospital grade AC outlet: specifically, a single branch circuit, 15- or 20-Ampere, 120-Vac, with an isolated and insulated ground wire (or the equivalent International circuit).
7. Set the system circuit breaker to ON.
8. Wait 15 seconds, then set the ON/STANDBY switch to ON.
9. Verify that LEDs 6 and 7 on the ACIM are constantly lit.
10. Verify power indicators are illuminated on internal peripherals.
11. Turn on power to all external peripherals and verify power indicators are illuminated.

NOTE Observe the required warm-up period for each peripheral before conducting image quality tests. Refer to the OEM manual supplied with the peripheral or the appropriate peripheral field service manual.

12. After completion of the initialization process, verify the following:
    - The scanhead connected in <Blue>step 3 of this procedure is selected and enabled.
    - A real-time 2D image is displayed on the monitor (Figure 6-1).
13. Throughout the performance tests, verify the following:
    - The image is correctly placed on the video display.
    - The LEDs associated with the buttons on the control panel are lit when that feature is activated.
    - Toggle switches, slidepots, trackball, and other moveable controls operate smoothly and efficiently.

Figure 6-1 Power-up Displays



System Configuration

Refer to "Show Installed Options" on page 235 to check the installed system options against the COA.

Monitor

The following procedure is used to set up the monitor for optimal viewing, and to check the range of contrast and brightness of the monitor:

1. Set the background color to midrange for all three colors (Color 1, Color 2, or Color 3).
2. Set brightness and contrast to minimum. Verify the video display has a flat black appearance.
3. Set contrast to maximum. Verify the level of contrast varies.
4. Adjust the brightness of the lightbar from maximum to minimum.
5. Set the background color, brightness, contrast, and light bar intensity to the factory default settings by simultaneously pressing and holding the up and down controls for each parameter.

NOTES

- Do not change the focus adjustment for this procedure. Monitor focus does not usually require field adjustment.
- You must wait for longer than 30 seconds, after changing control settings on 3500-2532-XX monitors (Brightness, Contrast, and Light Bar Intensity), for the settings to be retained in the monitor EEPROM. Turning off the monitor power during this period will require you to reset the control settings.

User Interface Tests

The following tests verify various system defaults and user-selectable configuration items, and selection of scanheads and applications:

NOTE Some controls listed in this section are feature-dependent and will not show up on all systems.

Keyboard Controls

1. Press Text or Title. Title allows annotation entry in the upper part of screen; Text enters characters at cursor's active position.
2. Press each alphanumeric key and verify the appropriate character is displayed.
3. Press Shift and the arrow keys and verify the appropriate symbols are displayed.
4. Press Shift and verify the shift functions for keys with shift characters.
5. Press remaining keys and dedicated pushbuttons and verify proper operation.
6. Rotate the trackball and verify the cursor moves evenly and without hesitation.

Softkeys

The softkeys are operational only when certain machine options have been installed. The machine options include: VCR, NetLink, 3D CPA, 3D Grayscale, and Advanced 3DI. If a machine option has been installed on the system and that particular mode of operation has been selected, the softkey LEDs display commands available for that particular mode. Refer to the *HDI 5000 Reference Manual* (P/N 4703-0027-XX) for the softkey functions.

Footswitches

Footswitch function can be operator-set using Footswitch setup in the Peripherals setups. Check which option is setup for each footswitch and verify the operation.

Installation Defaults Setup

1. Press the Setups key and click on Display.
2. Enter the appropriate Institution name, date, and time. Click on the diamonds to select desired time and date formats.
3. Exit Setups.

Patient Data on Systems without Worklist Feature

1. Press Patient Data.
2. On systems with 127.05 and lower software, continue with <Blue>step 3. On systems with 170.XX software and higher, select Patient Data.
3. Enter your name in the New Patient field.
4. Enter the system sales order (SO) number in the ID field.
5. Select Study Data. Enter your birth date in Date of Birth.
6. Verify your age is displayed correctly.

NOTE The Accession number is an optional 16-digit field used to track patient exams on systems with Image Management. It is unnecessary to enter anything into that field for this procedure.

7. Select Previous Exam and Close. Then close the Patient Data menu.

Patient Data on Systems with Worklist Feature

Systems with the Worklist feature are capable of automatically entering patient data in preparation for an exam. The worklist server and ultrasound system must be properly configured and communicating over a network. The worklist server must also have a worklist to transfer to the ultrasound system. Refer to *Manual Set Update* (P/N 4706-0027-06) for information on how to use the Worklist feature.

Scanhead Initialization

1. Press the Scanhead key.
2. Connect the following scanheads or equivalents as shipped with the system:
   L12-5 C8-4v P4-2 D5CW
3. Verify the scanheads connected are correctly displayed.
4. Select the desired scanhead and scanhead application. Verify the correct scanhead is identified at the top of the screen.
5. Verify the patient data and other information is correctly displayed and the clock is updating.

2D

Primary Controls

2D Gain

NOTE The TGC graphic on the display does not correlate to the TGC slidepot positions. The TGC graphic on the display represents the actual curve used by the beamformer.

1. Scan the phantom while performing these steps.
2. Connect any phased or curved array scanhead to the system.
3. Select the Generic/General optimized preset and select 2D mode.
4. Set all TGC slidepots to the center position.
5. Verify adjusting 2D GAIN from minimum to maximum moves the displayed TGC line from a flat line at the left edge of the depth markers to a flat line at the right edge of the display.
6. Verify that as 2D GAIN is increased and decreased, there is a corresponding increase and decrease in echo intensity.
7. Set 2D GAIN to mid-range.

TGC Slide Pots

1. If the TGC display is not present, press Setups, select Display, and turn TGC Display ON. (Moving a TGC slidepot will only bring up the TGC display for three seconds.)
2. Set 2D GAIN to mid-range or higher.
3. Verify adjusting each TGC slidepot from minimum to maximum moves the corresponding portion of the displayed TGC line from the left edge of the depth markers to the right edge of the display.
4. Verify increasing and decreasing the TGC gain results in a corresponding increase and decrease in echo intensity (depends on overall gain settings).
5. Set all TGC slidepots to the center position.

Focal Zones (number of focal zones)

1. Verify pressing ZONES up increases the number of focal zones (the number of Zones varies with scanhead type) or changes the distance between zones.
2. Verify pressing ZONES down decreases the number of focal zones (the number of Zones varies with scanhead type) or changes the distance between zones.

Focus

1. Verify pressing FOCUS up moves the focal zone up (positioned at shallower depths).
2. Verify pressing FOCUS down moves the focal zone down (positioned at deeper depths).

Depth

1. Verify pressing DEPTH up decreases the displayed depth and that the frame rate increases.
2. Verify pressing DEPTH down increases the displayed depth and that the frame rate decreases.

Output

1. Verify pressing OUTPUT up increases the echo intensity.
2. Verify pressing OUTPUT down decreases the echo intensity.

Top/Bottom

1. Verify pressing TOP/BOT up or down inverts the image top to bottom.
2. Verify that depth markers, focal zone marker, and the orientation marker change their orientation with the sector orientation.
3. Verify adjusting the top TGC slidepot still controls the near field part of the image while the image is inverted.

L/R Invert

1. Place the scanhead on the phantom with the orientation marker to the left. Verify the image orientation marker corresponds to the orientation mark on the scanhead.
2. Verify pressing L/R INVERT switches the image and the orientation marker left to right.

Compress

1. Press COMPRESS up or down.
2. Verify the dynamic range compression curve annotation changes from C1 to C6.

Sector Width

1. With a sector scanhead, verify that pressing SEC WIDTH down decreases the sector width.
2. Verify the frame rate increases as the sector width is decreased.
3. Verify pressing SEC WIDTH up increases the sector width.
4. Verify the frame rate decreases as the sector width is increased.

Zoom

1. Verify pressing ZOOM up increases the image magnification.
2. Verify the image orientation marker repositions to the far upper left of the display.
3. Verify the depth markers re-scale with the zoomed image.
4. Verify moving the trackball allows all portions of the image to be viewed.
5. Set the Zoom to normal magnification.
6. Verify the image, image orientation marker, and depth markers return to the normal state.

Cursor

1. Press CURSOR.
2. Verify a dotted line with a depth cursor is displayed.
3. Verify the trackball moves the dotted line and the depth cursor.

HD Zoom

1. Press HD ZOOM and verify the Zoom box is displayed and the trackball will position the box anywhere within the image.
2. Verify pressing SELECT fixes the position of the upper left corner of the box and the trackball now positions the lower right corner of the box to size it.
3. Position and size the box to surround a distinct feature (cysts or pins) within the phantom.
4. Press HD ZOOM and verify the image zooms so the area defined within the box is displayed to fill the image. Verify the HD ZOOM LED is lit.
5. Press HD ZOOM and verify the image returns to normal magnification and the box is no longer displayed.

Dual

1. Press DUAL and verify the sector is displayed on the left half of the display and is updating.
2. Press UPDATE and verify another sector is displayed on the right half of the display.
3. Verify the right sector is updating and the left sector is frozen.
4. Press UPDATE to toggle the live and frozen images from the left sector to the right and the right sector to the left.
5. Verify that adjusting any imaging control (except HD ZOOM, GAIN, TGC, and OUTPUT) affects only the live sector and each sector independently retains its imaging control settings from the last time it was active.
6. Press DUAL and verify a single full size sector is displayed.

SonoCT Real-Time Compound Imaging

1. Connect an L12-5 to the system.
2. Select a clinical option and a Tissue Specific™ preset. Verify the system defaults to 2D imaging.
3. Press SonoCT. Verify Compound imaging begins, and image information indicates Fr Rate:Surv or Fr Rate:Targ.
4. Press FR RATE to alternate the image information between Fr Rate:Surv and Fr Rate:Targ. Verify each setting has a different ultrasound beam scanning geometry.

NOTE To change frame rate during SonoCT Real-Time Compound Imaging, use the 2D PRF menu option on the 2D/M-mode menu.

5. Select the one that provides the best image quality.
6. Press SonoCT to return the system to its previous state. Entering any other imaging mode cancels compound imaging. Returning to 2D imaging automatically activates compound imaging if you had it selected.

Secondary Controls

Setup

1. Connect any phased or curved array scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select 2D mode and the desired scanhead.
4. Press 2D/M M to call up the 2D secondary control menu.
5. Scan the phantom while performing these steps.

Gray Maps

Verify that selecting - or + GMAP# changes the gray map number, the gray scale assignment of the gray bar, and the image data.

Chroma

1. Select Chroma.
2. Verify that when Chroma 1 or Chroma 3 is selected, the image and gray bar are colorized to a reddish hue.
3. Verify that when Chroma 2 or 4 is selected, the image and gray bar are colorized to a bluish hue.
4. Set Chroma OFF.

Persistence

It may be easier to see any changes in the Persistence if the scanhead is uncoupled from the phantom and the 2D Gain is turned up so the Far Field is saturated with noise.

Verify that increasing persistence smooths the image and mid-level echoes move in slow motion in response to scanhead movement.

Array Channel Test (Tower Test)

1. Select 2D mode and an L12-5 scanhead. (If an L12-5 scanhead is not available, use another linear or curved array scanhead.) Set OUTPUT, 2D GAIN and TGC to maximum, # Focal Zones to 1, and FOCUS to less than maximum depth.
2. Slowly slide the narrow edge of a six-inch metal ruler from one end of the face of the scanhead to the other.
3. Verify a single vertical band of echoes moves across the image in coordination with the motion of the ruler.

Penetration

NOTE While performing the steps in this section, scan the phantom.

1. Select a cardiology scanhead and the Adult Card - Gen Adult Card application.
2. Select 2D and scan the phantom to obtain an image that clearly shows both the horizontal and vertical rows of pins.
3. Press DISTANCE to activate a cursor.

NOTES

- Do not place the cursor under cysts or pins.
- Always apply the phantom reference value and tolerance to the measurement.

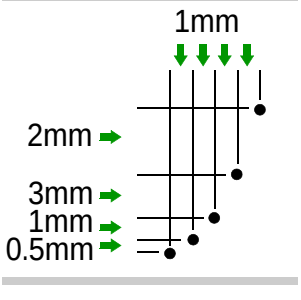
4. Set the cursor at the deepest vertical position where the scatter echoes start to break up and tissue definition is lost.
5. Verify scanhead performance.

Image Quality

1. Adjust the position of the scanhead on the phantom and 2D controls to obtain an image that clearly shows both the horizontal and vertical rows of pins.
2. Verify the image presents a uniform homogeneous echo pattern from the point of closest focus to the limit of penetration.
3. Adjust the focal zone position to correspond to the depth of a cyst.
4. Verify the cystic structure at the focal zone is echo free, round, and with sharp wall definition.

Axial Resolution

Obtain a phantom image of a set of axial resolution pins. Refer to the diagram (right). Distances between the pins may vary by phantom model. See the *General Service Manual*, P/N 4720-0219-XX, or reference your phantom service manual for details.



Axial Measurement Accuracy

1. Connect a P3-2 or P4-2 scanhead to the system. Select the Generic/General preset.
2. Select 2D mode.
3. Adjust the position of the scanhead on the phantom and 2D system controls to obtain an image that clearly shows both the horizontal and vertical rows of pins.
4. Press FREEZE to freeze the image.
5. Press DISTANCE to display the measurement cursor.

6. Measure the distance between the center of two pins that are vertically spaced 6 cm apart.
7. Verify and record the distance measured is 6.00 cm + 0.06 cm.

Lateral Measurement Accuracy

1. Perform <Blue>step 1 through <Blue>step 5 of the Axial Measurement Accuracy procedure.
2. Measure the distance between the center of two pins that are horizontally spaced 6 cm apart.
3. Verify and record the distance measured is 6.00 cm + 0.12 cm.
4. Press FREEZE to unfreeze the system.

Registration Accuracy

1. Connect a P3-2 or P4-2 scanhead to the system and select the Generic/General preset.
2. Select 2D mode. Set the depth to 15.2 cm.
3. Press DISTANCE to display the measurement cursor.
4. Place the cursor on the center of the top depth marker.
5. Press SELECT and place the second cursor on the center of the 13-cm depth marker.
6. Verify/record the distance measured is 13.00 cm + 0.26 cm.
7. Press Del Meas to remove all measurement cursors.

Cineloop Manual Playback

1. Slowly slide the scanhead across the phantom.
2. Press FREEZE.
3. Verify the trackball movement left or right scrolls through the captured Cineloop frames.

Cineloop Automatic Playback

1. Display the Cineloop menu.
2. Verify the Play/Pause starts and pauses Cineloop, and the image data indicates loop.
3. Verify selecting + Speed increases the playback speed.
4. Verify selecting - Speed decreases the playback speed.

5. Verify selecting Sweep/Loop changes between sweep and loop mode, and the image data reflects the current mode selected.
6. Verify selecting Trim displays the Cineloop trim graphic.
7. Verify trackball and SELECT allow positioning of both trim markers.
8. Verify selecting Play/Pause loops through the frames defined by the trim markers.

Annotation

1. Verify pressing Body Marker sequences through the available body markers and the marker can be positioned anywhere within the image.
2. Verify pressing Superkey + SH Pos displays the scanhead marker on the body marker.
3. Verify the trackball can position the scanhead marker anywhere within the body marker and can rotate the scanhead marker.
4. Verify pressing Erase Screen clears the body marker, and the scanhead marker.
5. Verify pressing Title displays the cursor in the default home position.
6. Verify data can be entered into the title field and pressing Erase Line clears all entered data.
7. Verify pressing Text displays the cursor in the default home position.
8. Verify data can be entered into the text field and pressing Erase Text clears all entered data.
9. Verify pressing Arrow creates a pointer.
10. Verify the trackball can position the arrow anywhere within the image.
11. Verify pressing Erase Arrow clears the pointer.

2D Color

Primary Controls

Setup

1. Connect a scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select 2D Color mode.
4. Acquire a Doppler image.

Color Gain

1. Increase and decrease Color Gain.
2. Verify that as Color Gain is increased and decreased the amount of color noise displayed within the color box increases and decreases.
3. Set Color Gain to mid-range.

Color Box

1. Verify the Color annotation is displayed.
2. Verify the trackball will position the Color Box anywhere within the image.
3. Verify that pressing SELECT fixes the position of the upper left corner of the box and that the trackball now positions the lower right corner of the box to size it.

Steer (Linear Scanheads Only)

1. Press STEER. Verify the color box changes shape shifting left or right pivoting around its center.
2. Press STEER again several times. Verify the system cycles through the various steering angles on the display.

Baseline

1. Press BASELINE up and verify the baseline of the color bar moves to the top of the color bar and the color scale updates accordingly.
2. Press BASELINE down and verify the baseline of the color bar moves to the bottom of the color bar and the color scale updates accordingly.

Scale

Verify that pressing SCALE up and down will increase and decrease the range of the color bar scale image data.

Wall Filter

Verify that pressing FILTER up and down changes the wall filter setting from low, medium, high, to max.

Invert

Verify that pressing INVERT up and down changes the color map from top to bottom.

Priority

1. Press PRIORITY up and verify the write priority mark on the gray bar moves to the top of the bar and color overwrites the corresponding gray shades.
2. Press PRIORITY down and verify the write priority mark on the gray bar moves to the bottom of the gray bar and gray shades overwrite the color.

NOTE Allow the PRIORITY to update between key depressions. Pressing PRIORITY rapidly in succession will cause the system to lockup.

Secondary Controls

Setup

1. Connect any phased, curved, or linear scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Color mode.
4. Display the color annotation.
5. Press COLOR MENU.

Color Maps

1. Select Color Maps.
2. Verify that selecting each of the color maps changes the color assignment of the color bar.

Persistence

1. Select Persistence.
2. Verify that selecting higher settings slow the color image update rate and that the annotation is updated.

Post Processing - Color Capture

Verify that selecting Capture turns the feature on and off.

Post Processing - Color Tag

NOTE The color tag range depends on the color settings.

1. Set the system parameters as indicated in Table 6-1.
2. Press FREEZE.

3. Repeatedly select Color Tag and verify the feature turns on and off.
4. Verify the parameters for position and size of Color Tag are operational and the display updates accordingly.

Table 6-1 Color Tag Parameter Settings

Parameter	Setting
Color Velocity	1-128
Position	Increments by 8
Size	Increments by ±2 from center position
Velocity/Variance	1 - 32
Position	Increments by 2
Size	Increments by ±1 from center position

Line Density

Verify selecting higher settings increases the image sharpness and the annotation is updated.

Color Smoothing

1. Select Smooth.
2. Verify the setting changes from low, medium, high to off, and the displayed color transitions accordingly.

Mode

1. Select Mode.
2. Verify the setting changes from V+V, Vel, to Pwr and the color bar changes accordingly.

Color Display

1. Press Superkey and CDisp.
2. Verify the color bar and the image color data are not displayed.
3. Press Superkey and CDisp.
4. Verify the color bar and the image color data are displayed.

DMD (Dynamic Motion Differentiation)

Verify selecting DMD turns the feature on or off.

Units

Verify selecting Freq or Vel changes the scaling annotation of the color bar.

NOTE Units do not apply to Power mode.

Color Power Angio

Setup

1. Connect an L10-5 or L12-5 scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Power Imaging mode.
4. Obtain a Doppler image that clearly shows fluid flow.
5. Verify the power imaging background is of uniform color and texture.
6. Verify the colorized Doppler information is displayed within the vessel.
7. Display the PWR secondary menu.

Power Maps

1. Select Power Maps.
2. Verify selecting each of the color maps changes the color assignment of the color bar and the power imaging background.

Persistence

1. Select Persistence.
2. Verify selecting higher settings slows the color image update rate.

Line Density

Verify selecting higher settings increases the image sharpness.

3D CPA

1. Adjust the scanhead position to obtain an image that clearly shows fluid flow.
2. Press 3D and acquire data. For systems with 124.13 software and above, press 3D UNCAL.
3. Press FREEZE.
4. Press 3D/CINE to display the 3D/Cine secondary menu.
5. Select Create 3D.
6. Verify the system indicates it is rendering a 3D image.
7. When rendering is complete, verify the system is sweeping through the 3D Cineloop.
8. Press FREEZE.

Doppler

Primary Controls

Setup

1. Select and initialize an L12-5 scanhead.
2. Select the Generic/General optimized preset.
3. Press PULSED.
4. Acquire a Doppler image.

5. Verify the Doppler image information is displayed.
6. Press UPDATE.
7. Verify the Doppler display is scrolling.

Wall Filter

Press FILTER up and verify the wall filter annotation changes from low to medium to high.

Baseline

Press BASELINE up and down to verify the Doppler baseline can be positioned from the top to the bottom of the scale.

Scale

Press SCALE up. Verify the range displayed on the Doppler scale changes.

Angle Correction

1. Press 0/60× and verify the M Line changes from +60× to -60× to 0×.
2. Press ANG COR. Verify the angle correction graphic moves and the annotation graphics update by 2× increments.

Sample Volume Size

Press SV SIZE and verify the displayed sample volume changes size and the annotation is updated with the new size.

Invert

Press Invert and verify the Doppler spectral data and the scale inverts relative to the baseline.

Footswitch

1. Press Patient Data and enter “Y” to select New Patient.
2. Enter your name in the Name field.
3. Press Patient Data to begin the new exam.
4. Connect a footswitch assembly to the system.
5. Configure the system to store an image to the hard disk or to print to an internal printer to activate the footswitch print function.
6. Press the left footswitch and verify the system prints or stores an image.
7. Press the middle footswitch and verify 2D freezes and the UPDATE LED is not lit. Press it again and verify 2D is updating and the UPDATE LED is on.
8. Press the right footswitch and verify the system freezes and the FREEZE LED is lit. Press it again and verify the system begins updating and the FREEZE LED is not lit.
9. Disconnect the footswitch assembly from the system and delete any exams saved to the hard disk.

Secondary Controls

Setup

1. Connect any phased, curved, or linear scanhead to the system.
2. Select the Generic/General optimized preset.
3. Press PULSED.
4. Press DOPPLER MENU to display the Doppler secondary control menu.
5. Acquire a Doppler image.

Doppler Gray Maps

1. Select Gray Maps.
2. Verify selecting each of the gray maps changes the grayscale assignment of the Doppler data.
3. Verify the selected grayscale map is displayed in the Doppler annotation.

Chroma

1. Select Chroma.
2. Verify that when Chroma 1 is selected, the image and gray bar are colorized to bluish-yellow.
3. Verify that when Chroma 2 is selected, the image and gray bar are colorized to violet-yellow.
4. Verify that when Chroma 3 is selected, the image and gray bar are colorized to blue.
5. Verify that when Chroma 4 is selected, the image and gray bar are colorized to gold.
6. Set Chroma OFF.

Scale Units

Verify the Doppler scale displays the scale units selected.

Doppler Sweep Speed

1. Select each Doppler sweep speed.
2. Verify the right to left display movement (sweep speed) changes accordingly.

Display Format

1. Select the Small, Medium, and Large display formats and verify the Doppler display changes accordingly.
2. Select 2D.

PW Doppler Noise Bands

1. Connect a P3-2 or P4-2 scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select Pulsed Doppler mode.
4. Set the system controls as indicated in Table 6-2.
5. Reduce DOP GAIN just until the background noise disappears.
6. Observe the spectral display for noise bands.
7. Obtain a Doppler spectral trace.
8. Increase and decrease the PRF and observe the display for noise bands.
9. Repeat steps 5 through 8 for sample volume sizes of 2, 3, and 5 mm.

Table 6-2 PW Doppler Noise Band Control Settings

Control	Setting
Output	Maximum
Sample Volume Depth	9.0 cm
Sample Volume Size	1.5 mm

Steered CW Doppler Noise Bands

1. Disconnect all scanheads.
2. Use the ON/STANDBY switch to cycle system power OFF, then ON.
3. Press Superkey + 0 to display the Machine Diagnostics login dialog box.
4. Login as “CSR” to the Machine Diagnostics interface. The password is “USER.”
5. Select Test, Utils, from the Diagnostics menu.
6. Double-click Machine, and select Doppler Ultrasound and Tests and Utils.
7. Execute CW Calibration Utility, and verify it reports a passing condition.

8. Reboot the system using the ON/STANDBY switch.
9. Connect a P3-2 or P4-2 scanhead to the left scanhead receptacle. Keep the face of the scanhead dry and uncoupled for performance of this test.
10. Select the Generic/General Tissue Specific preset.
11. Select Pulsed Doppler mode.
12. Set the system controls as indicated in Table 6-3.
13. Press CW. Press UPDATE.
14. Adjust DOP GAIN to obtain clearly visible background noise in the scrolling display.
15. Adjust the D-line ±15 degrees around the centerline of the 2D image to locate the position that produces the most CW noise.
16. Adjust DOP GAIN according to Table 6-4, and verify the spectral display is clear of noise bands.
17. Repeat this procedure using the P5-3 scanhead connected to the right scanhead receptacle.

Table 6-3 Steered CW Doppler Noise Band Parameter Settings

Parameter	Setting
Output	Maximum
Depth	P3/P4-2: 17.7 cm, P5-3: 17.5 cm
Sample Volume Depth	P3/P4-2: 16 cm, P5-3: 10 cm
Doppler Gray Map	Map 2
Doppler Display Format	Large

Table 6-4 Steered CW Noise Detection Thresholds

PRF (Hz)	Doppler Gain (%)
50,000	53
41,667	54
31,250	54
25,000	55
20,000	56
15,625	56
14,286	57
11,905	57
10,000	57
8,333	58
5,000	5
3,731	6
2,500	6
1,515	7

M-mode

Primary Controls

Setup

1. Connect any phased, curved, or linear scanhead to the system.
2. Select the Generic/General optimized preset.
3. Select M-mode.
4. Acquire an image.

M-Line

Verify the trackball smoothly moves the M-line from the left image edge to the right image edge.

Secondary Controls

Setup

Press 2D/MM to display the 2D/M-mode secondary control menu.

Sweep Speed

1. Select Speed.
2. Verify that as higher and lower settings are selected, the M-mode display rate correspondingly increases and decreases with the setting.

Display Format

Select the Small, Medium, and Large display formats and verify the M-mode display changes accordingly.

Simultaneous Modes

Setup

1. Connect an L12-5 scanhead to the system.
2. Select the Cerebrovascular/Carotid optimized preset.

2D + PW Doppler

1. Press PULSED.
2. Press DOPPLER MENU to display the Doppler secondary control menu.
3. Select 2D UPDATE.
4. Select Simul.
5. Verify both 2D and Doppler are active.

2D + PW Doppler + Color

1. Select Color mode.
2. If the Doppler secondary control menu is not displayed, press DOPPLER MENU.
3. Select 2D UPDATE.
4. Select Simul.
5. Verify 2D, Doppler, and Color are active.

2D + PW Doppler + CPA

1. Press PULSED.
2. If the Doppler secondary control menu is not displayed, press DOPPLER MENU.
3. Select 2D UPDATE.
4. Select Simul.
5. Select Power Imaging.
6. Verify 2D, Doppler, and CPA are active.

DiskLink

Begin Exam

1. Press Patient Data.
2. Select New Patient.
3. Enter your name in the name field.
4. Press Patient Data to begin the new exam.

Storing Black/ White Images

1. Press Print to store the image to the hard disk.

CAUTION

During rapid printing to disk (one print every 7-10 seconds) the image memory will fill to capacity and the system appears to lock up. However, the system will fully recover after the images are stored. Do not turn off system power during image storage. Turning off system power may result in damage to the hard drive and necessitate replacement.

2. Verify the system freezes the image.
3. Verify the system beeps.
4. Verify the system unfreezes the image.
5. Verify the BW# and/or PG# annotation on the left side of the display increments one number to indicate a black and white image has been stored.
6. Press FREEZE.
7. Press PRINT to store six additional images.
8. Press DEL IMG.

9. Select Delete.
10. Verify the BW# and/or PG# decrements one number indicating an image has been deleted.

Storing Color Images

1. Select Color mode.
2. Increase the COL GAIN until color pixels are displayed.
3. Press PRINT to store the image to the hard disk.
4. Verify the system freezes the image.
5. Verify the system beeps.
6. Verify the system unfreezes the image.
7. Verify the COL# and/or PG# annotation on the left side of the display increments one number to indicate a color image has been stored.
8. Press FREEZE.
9. Press PRINT to store 4 additional images.
10. Press DEL IMG.
11. Select Delete.
12. Verify the COL# and/or PG# indicates the last color image has been deleted.
13. Press END EXAM.

Storing Loops

1. Select Color mode.
2. Increase the COL GAIN until color pixels are displayed.
3. Press FREEZE.
4. Use the trackball to scroll through each frame of the loop.
5. Verify there are no image artifacts in each frame.

6. Press CAPTURE.
7. Verify the frame number increments indicating the loop is being stored.
8. Press END EXAM.

Reviewing Images

1. Press NET/DISK.
2. Select Hard Disk to display the exam directory on the hard disk.
3. Verify the information entered for the exam just completed is correct.
4. Select the exam just completed.
5. Select Review Images.
6. Select the Zoom Graphic on one of the stored images.
7. Verify the image is displayed in one-on-one format.
8. Select Meas/Edit.
9. Verify the image appears like a normal acquisition screen.
10. Press REVIEW.
11. Verify the image is displayed in multi-image format.

Copying Images

1. Begin a new exam.
2. Press PRINT to store an image.
3. Press END EXAM.
4. Insert a formatted optical disk in the system drive.
5. Select Exam Dir to display the list of exams on the hard disk.
6. Select the last exam.
7. Select Copy To, then select OK to copy the image to the optical disk.

NOTE When copying images to the optical disk, two patients cannot have the same ID number. If this happens, both sets of images will be stored under the first patient name and will reference the same ID number. Always use a unique ID number for each patient.

8. Display the Exam Directory on the optical disk. Verify the image was copied from the hard disk to the optical disk.
9. Delete the image from the hard disk (before copying from the optical disk to the hard disk).
10. Select the exam just copied to the optical disk.
11. Select Copy To, then select OK to copy the image to the hard disk.
12. Display the Exam Directory on the hard disk.
13. Select the exam just copied to the hard disk.
14. Select Review Images.
15. Verify the image quality of each of the images is the same, and the image quality has not degraded.
16. Press Patient Data.
17. Select New Patient. Do not enter data in the Name or ID fields.
18. Press Patient Data to begin the new exam.
19. Display the Exam Directory on the hard disk.
20. Delete all exams.
21. Display the Exam Directory on the optical disk.
22. Delete all exams.
23. Press Setups.
24. Select Image Management.

25. Select Printer Selection to display the Image Management Printer setup panel.
26. Set the printer setup options as indicated in Table 6-5.

NOTE If “Printed Image Destination” is set to “All to B/W Printer”, the images stored to the optical disk will be black and white images only.

27. Select Setups Directory.
28. Select Image Management.
29. Select General Options.
30. Select Close.
31. Press NET/DISK and eject the optical disk by selecting Eject Disk.

Table 6-5 DiskLink Printer Setup Options

Option	Setting
B&W Film Format	1 x 2
Color Film Format	2 x 3
Printed Image Destination	All to B/W Printer

NetLink

1. Press Setups.
2. Select Image Management and press SELECT.
3. Select Printers and press SELECT.
4. Select a B&W print destination. Also, select whether the B&W images are to be sent to the color printer.
5. Select Close and press SELECT.
6. Press Patient Data.

7. Select New Patient.
8. Enter your name in the name field.
9. Press Patient Data to begin the new exam.
10. Scan a phantom.
11. Press PRINT to save the image.
12. Press END EXAM to end the exam.
13. Verify the image has been printed on the network printer.

WebLink Connectivity

1. Establish an IP address for the system at the site.
2. Verify the system is connected to site network.
3. Verify the WebLink™ option is enabled in setups. (Setups > Image Management > Network Configuration > WebLink On)
4. Connect a PC or Workstation at the site to the network and have a Web browser (Netscape or Internet Explorer) available.
5. Open a connection to the system by typing the IP address of the system directly at the Web browser's location prompt. For example:

   http://149.59.240.75/

NOTE Use proper IP address syntax with leading zeroes consistent with the rest of the network.

6. Verify a prompt is displayed requesting a user name and password for WebLink connectivity.
7. If this is the first time WebLink has been used, enter "admin" for the user name, and "WebLink" for the password.

8. Select OK.
9. Verify a Web page is displayed.

ECG

Setup

1. Connect a P3-2 or P4-2 scanhead to the system.
2. Select the Adult Card/General preset.
3. Connect an ECG cable to the system.
4. Set the Leakage Tester/ECG simulator as indicated in Table 6-6.
5. Verify the ECG R wave is a positive going pulse.
6. Verify the measured heart rate stabilizes at 180 BPM +5 BPM.
7. Set the ECG simulator Rate to 120 BPM.
8. Verify the measured heart rate stabilizes at 120 BPM +1 BPM.
9. Set the ECG simulator Rate to 60 BPM.
10. Verify the measured heart rate stabilizes at 60 BPM +1 BPM.
11. Display the Physio secondary control menu.
12. Increase the ECG Gain and verify the amplitude of the ECG waveform increases.
13. Decrease the ECG Gain and verify the amplitude of the ECG waveform decreases.
14. Increase the ECG Position and verify the ECG waveform moves up on the display.

15. Decrease the ECG Position and verify the ECG waveform moves down on the display.
16. Select Configure.

Table 6-6 Leakage Tester/ECG Simulator Setup Options

Parameter	Setting
Output	2.0 mV
Rate	180
OFF/ECG/PULSE	ECG

Triggering

1. Set the ECG trigger type A and B to ON.
2. Slowly increase A Delay and verify the A trigger moves to the right above the ECG waveform.
3. Slowly decrease A Delay and verify the A trigger moves to the left.
4. Slowly increase B Delay and verify the B trigger moves to the right.
5. Slowly decrease B Delay and verify the B trigger moves to the left.
6. Position both triggers so they are clearly visible on the ECG waveform.
7. Press UPDATE to enable triggering mode. Verify the UPDATE submenu appears in the lower left of the monitor.
8. Slide the scanhead across the phantom. Verify the image is updated at each trigger.
9. Slide the scanhead across the phantom. Press FREEZE and verify the UPDATE submenu disappears.
10. Verify the trackball movement scrolls the Cineloop marker along the ECG waveform and the image updates as the marker crosses each trigger.
11. Press FREEZE, then UPDATE. Verify the image updates continuously.

12. Select M-mode.
13. Center the ECG waveform vertically on the M-mode display.
14. Set the ECG simulator rate to 30 BPM.
15. Verify the measured heart rate stabilizes at 30 BPM +1 BPM.
16. Immediately after a new QRS waveform is displayed, press FREEZE.
17. Press ADV MEAS to display the Meas Tools menu.
18. Select Time/Slope.
19. Position the cursor on a distinctive location on the QRS waveform and press SELECT.
20. Position the second cursor on the corresponding location on the next QRS waveform (left or right).
21. Verify the measured time interval is 2.00 +0.04. seconds (less than 2 percent error.)
22. Press DEL MEAS.

Multi-Frame Triggering

1. Press 2D, then TRIGGERS.
2. Press + and - Frames. Verify the Frames setting increments.
3. Press + and - to increase and decrease the Frame Interval. The Frame Interval is used to select a delay between frames if there are multiple frames for each trigger. FR is the normal frame rate.
4. Disconnect the ECG simulator.

Multiplane TEE Scanhead Face Temperature

Refer to the *Multiplane TEE Scanhead Service Manual* (4730-0292-XX) to determine whether the particular ultrasound system and scanhead are capable of detecting a scanhead over-temperature condition.

ISEM

System Setup

1. Press Setups.
2. Select Peripheral from the Directory of Setups.
3. Set the Internal Printer option to Select Sony Color.
4. Exit Setups.
5. Connect a P3-2 or P4-2 scanhead to the system.
6. Select the Adult Card/General preset.
7. Select 2D Color mode.
8. Display a large color box filled with color.

ISEM Setup

1. If the shipping disk is installed, eject the disk.
2. Verify the system LED is lit on the video control box.
3. Select Stress Echo as the video source. Verify the ISEM menu bar is displayed above a blue screen, and the Stress Echo LED is lit.
4. Select Digital/Live. Verify the system video is displayed.
5. Select Setup on the menu bar.
6. Select Input Source.

7. Set the video source options as indicated in Table 6-8.
8. Select OK.
9. Select Setup on the menu bar, then select Video Calibration.
10. Set the video calibration settings as indicated inTable 6-7.
11. Select OK.
12. Select Setup on the menu bar, then select Control Panel.
13. Set the date and time setup options as indicated in Table 6-9.
14. For NTSC systems, click DONE to close the Control Panel window.
15. For PAL systems, click on the system video to close Control Panel window.
16. Press CNTL+N to begin a new patient.
17. Enter your name into the name field.
18. Enter a made-up ID number into the ID field.
19. Select OK.

Table 6-7 ISEM Video Calibration Settings

	Setting	
Parameter	**NTSC**	**PAL**
Audible ECG	On	On
ECG Threshold	23%	23%
Brightness	60%	63%
Contrast	50%	47%
Graphics	68%	68%

Table 6-8 ISEM Video Source Settings

Parameter	Setting
Video Source	RGB
Video Sync Type	Composite
ECG Source	Hidden
Machine Type	HDI 3000

Table 6-9 ISEM Date and Time Setup Options

Parameter	Setting
Date Format	Month-Day-Year
Time	Current Time
Date	Current Date
Mouse Tracking Speed	Default Value

ISEM Footswitch

1. Press ALT+A and select Page-full, then OK. Verify the footswitch icons are displayed.
2. Press the left footswitch and verify the system indicates that images are being captured.
3. Press the middle footswitch and verify the system indicates it is preparing the image for storage.
4. Press the right footswitch and verify the footswitch icons and the status bar disappear.

ISEM Hand Controller

1. Press ALT+A and select Page-full, then OK. Verify the footswitch icons are displayed.
2. Press the key on the hand controller and verify the system indicates that images are being captured.

3. Press the ●● key on the hand controller and verify the system indicates it is preparing the image for storage.
4. Capture several more images.
5. Press the ●●● key on the hand controller and verify the footswitch icons and the status bar disappear.
6. Select 2D mode.

Image Review

1. Select Patient Files then select Patient Directory.
2. Select the patient name entered in <Blue>step 17 of the ISEM Setup test procedure.
3. Select Load.
4. Verify the menu bar indicates image x of y, where x is the image number and y is the number of images captured.
5. Press the left and right arrow keys on the hand controller to sequence through the images. Verify each of the images accurately reflect the system image.

Hard Disk Clean-up

1. Select Display, then select Close all Collections, and then select Yes.
2. Select Patient Files, then select Patient Directory, and OK.

NOTE Do not delete the patient files named “TEST, NTSC (or PAL), and Monitor Setup.

3. Highlight the patient entries created during this test, then select Delete, and OK.
4. Verify the selected files have been deleted.

5. Select Cancel.
6. Select System as the video source. Verify the system monitor is no longer displaying ISEM video, and the System LED is lit.

OEMs

OEMs are only tested for basic functionality and their interface to the system.

VCR

1. Press COLOR on the system.
2. Press Play + REC and verify the VCR begins recording. (For internal VCRs, use the on-screen controls or the VCR control panel. External VCRs do not have on-screen controls.)
3. Record several minutes of image data and audio.
4. Rewind the cassette and press PLAY.
5. Verify the playback image is stable.
6. Adjust Doppler gain and color gain. Verify color hue and intensity is adjusted on the monitor.
7. Verify the audio plays back.
8. Pause the image during playback.
9. Verify the paused image is stable.
10. While in the Pause mode, verify the VCR will search forward and reverse where the speed of the search is dependent on the directional movement of the VCR search control.
11. Verify the positive flow audio is on the left speaker, and negative flow is on the right speaker.
12. Verify the audio volume can be varied with the volume control.
13. Press STOP on the VCR.
14. Select 2D mode.
15. Set Depth to 15.2 cm.

16. Adjust the position of a scanhead on the phantom and the 2D system controls to obtain an image that clearly shows both the horizontal and vertical rows of pins.
17. Record a few minutes of the 2D image.
18. Rewind the tape and play the recorded 2D image.
19. Press FREEZE.
20. Verify the VCR image displayed is frozen.
21. Verify the VCR has paused.
22. Using the trackball, verify each of the grabbed images can be displayed.
23. Press DISTANCE to display the calibration menu.
24. Calibrate the measurement cursors using the depth markers.
25. Place the cursor on the center of one of two pins vertically spaced 6 cm apart.
26. Press SELECT and place the second cursor on the center of the other pin that is 6 cm apart vertically.
27. Verify the distance measured is 6.00 cm + 0.12 cm (+2%).
28. Press DEL MEAS to remove the measurement cursors.
29. Press FREEZE.
30. Verify the VCR resumes playback.
31. Press STOP, then EJECT, and remove the tape.

B/W Video Printer

Verify that pressing PRINT initiates a B/W hardcopy print.

Color Video Printer

1. Select Color Doppler mode and obtain a color image.
2. Press PRINT to take a print.

3. Verify the print LED blinks when Print is pressed, and 45 to 90 seconds later, blinks again three times to indicate completion of print (refer to color printer service manual).
4. Verify the prints have the correct image size, blanking, and color reproduction.

Multi-image Camera

1. Acquire an image using a phantom.
2. Set the system depth, TGC, and gain controls to mid-range. Adjust the 2D maps to achieve a mid-level gray.
3. Press FREEZE.
4. Take a print of a positive 2D image and a print of a scrolling video display (M-mode or Doppler).
5. Take six exposures for each sheet of film. After the sixth exposure, verify the camera alternately displays “Complete” then “Remove Cassette”.
6. Re-install the dark slide with the black border of the dark slide outward, and remove the film cassette from the camera.
7. Process the film and verify the following:
   a. There is no video blanking visible within 1.0 mm of any image border.
   b. The gray bar transitions evenly from white to black.
   c. The print graphics are clear, legible, and not cut-off.
   d. The print density is even throughout the print.
   e. There are no fogging, chemical marks, roller scratches, smudges, or light leaks.

Performance Test Checklist

“System Power Up and Initialization” on page 152 . . . . . ❑
Setup Parameters . . . . . ❑
“Monitor” on page 155 . . . . . ❑

Contrast ❑
Brightness ❑
Linearity ❑
“User Interface Tests” on page 156 ❑
“Keyboard Controls” on page 156 ❑
Dedicated pushbuttons ❑
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“Secondary Controls” on page 163 ❑
“Array Channel Test (Tower Test)” on page 164 ❑
“Penetration” on page 164 ❑
“Image Quality” on page 165 ❑
“Axial Resolution” on page 165 ❑
“Axial Measurement Accuracy” on page 165 ❑
“Lateral Measurement Accuracy” on page 166 ❑
“Registration Accuracy” on page 166 ❑
“Cineloop Manual Playback” on page 166 ❑
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"Annotation" on page 167 ❑
"2D Color" on page 168 ❑
"Primary Controls" on page 168 ❑
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"Color Power Angio" on page 172 ❑
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"PW Doppler Noise Bands" on page 177 ❑
"Steered CW Doppler Noise Bands" on page 177 ❑
"M-mode" on page 180 ❑
"Primary Controls" on page 180 ❑
"Secondary Controls" on page 180 ❑
"Simultaneous Modes" on page 181 ❑
"2D + PW Doppler" on page 181 ❑
"2D + PW Doppler + Color" on page 181 ❑
"2D + PW Doppler + CPA" on page 181 ❑

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“Begin Exam” on page 182 ❑
“Storing Black/White Images” on page 182 ❑
“Storing Color Images” on page 183 ❑
“Reviewing Images” on page 184 ❑
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“NetLink” on page 186 ❑
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“Triggering” on page 189 ❑
“Multi-Frame Triggering” on page 190 ❑
“Multiplane TEE Scanhead Face Temperature” on page 191 ❑
“ISEM” on page 191 ❑
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“ISEM Setup” on page 191 ❑
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"B/W Video Printer" on page 196 . . . . . ❑
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Phased Array Scanhead . . . . . ❑
Scanhead Control . . . . . ❑
Focal Zones and Focal Depth . . . . . ❑
Sector Angle. . . . . ❑
Image Quality . . . . . ❑
Linear Array Scanhead . . . . . ❑
Scanhead Control . . . . . ❑
Focal Zones and Focal Depth . . . . . ❑
Image Quality . . . . . ❑
Curved Array Scanhead . . . . . ❑
Scanhead Control . . . . . ❑
Focal Zones and Focal Depth . . . . . ❑
Image Quality . . . . . ❑

7 Adjustments

Power Supply Voltage Adjustments

There are no power supply voltage adjustments. The voltages can be measured directly on the PSM rear panel or remotely using UpLink. Refer to Section 8, "Troubleshooting", for the test point locations, or to the UpLink manual (P/N 4730-0236-XX). If a voltage is out of tolerance, the system will not automatically shut down, but may attempt to cycle power continuously until the system is manually shut off, and the PSM is replaced. Voltages are monitored by the FEC.

Monitor Adjustments

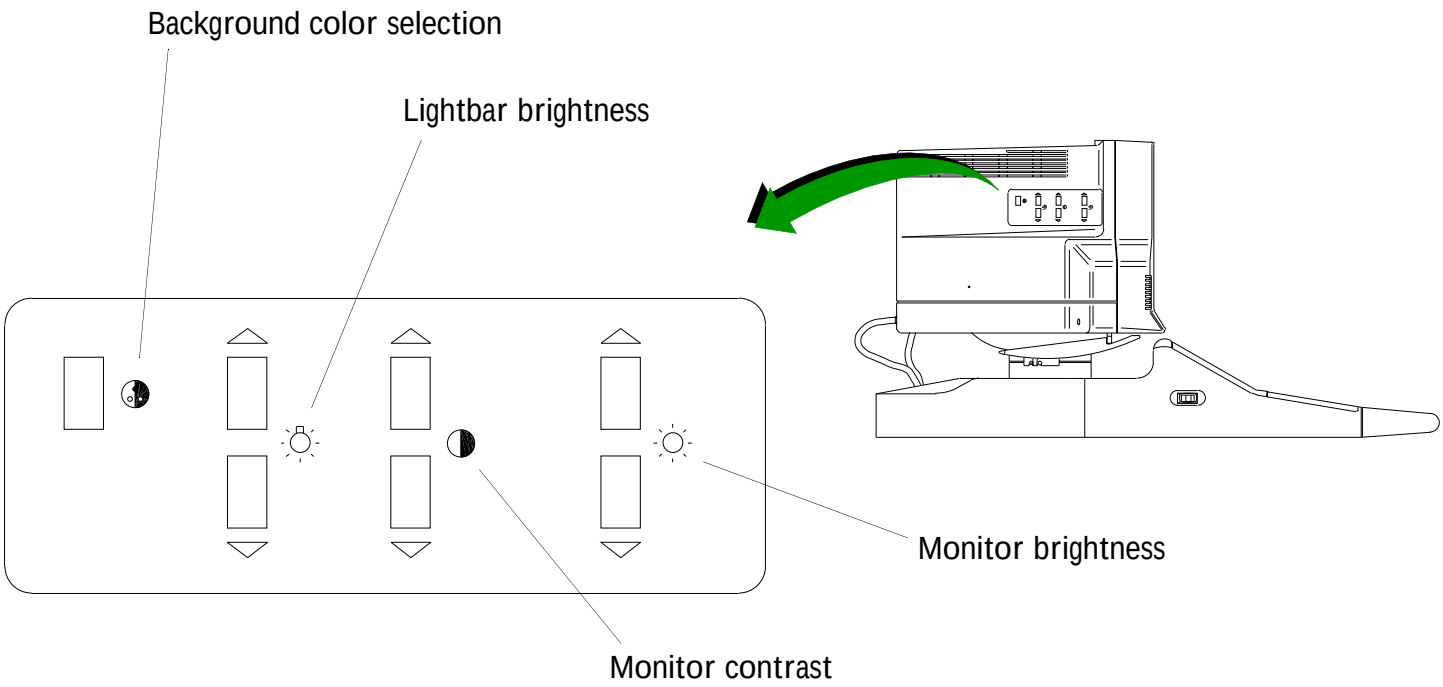
Monitor field adjustments include contrast, brightness, color background, and lightbar brightness (Figure 7-1). The adjustments can be set to factory default settings or to any setting desired by the user.

The adjustment settings are retained in an EEPROM in the monitor. However, to limit the number of settings written to the EEPROM, there is a delay of 30 seconds between the time the adjustment is made and the time the settings are stored. If the ultrasound system is powered down before the monitor has stored the new settings to the EEPROM, the previous control settings will be used the next time the monitor is powered up.

When a control is pressed, the current control setting is displayed for approximately 3 seconds.

All other monitor adjustments are microprocessor-controlled. The procedures and the software required to manually adjust the microprocessor-controlled adjustments are currently being developed.

Figure 7-1 Monitor Control Locations



➤ **To set the monitor controls to the factory default settings**

1. Simultaneously press the up and down contrast controls twice to set the monitor to the factory default of 80.

2. Simultaneously press the up and down brightness controls twice to set the monitor to the factory default of 20.
3. Simultaneously press the lightbar controls twice to set the monitor to factory default of 16.
4. Press the background color control to select the background color on the display. Color 1 is the factory default option. (Color 1 adds a blue tint to the background, Color 2 is neutral, and Color 3 adds a red tint.)
5. Press the lightbar brightness control to adjust control panel illumination.
6. To store the factory default settings in the monitor EEPROM, wait 30 seconds before powering down the system.

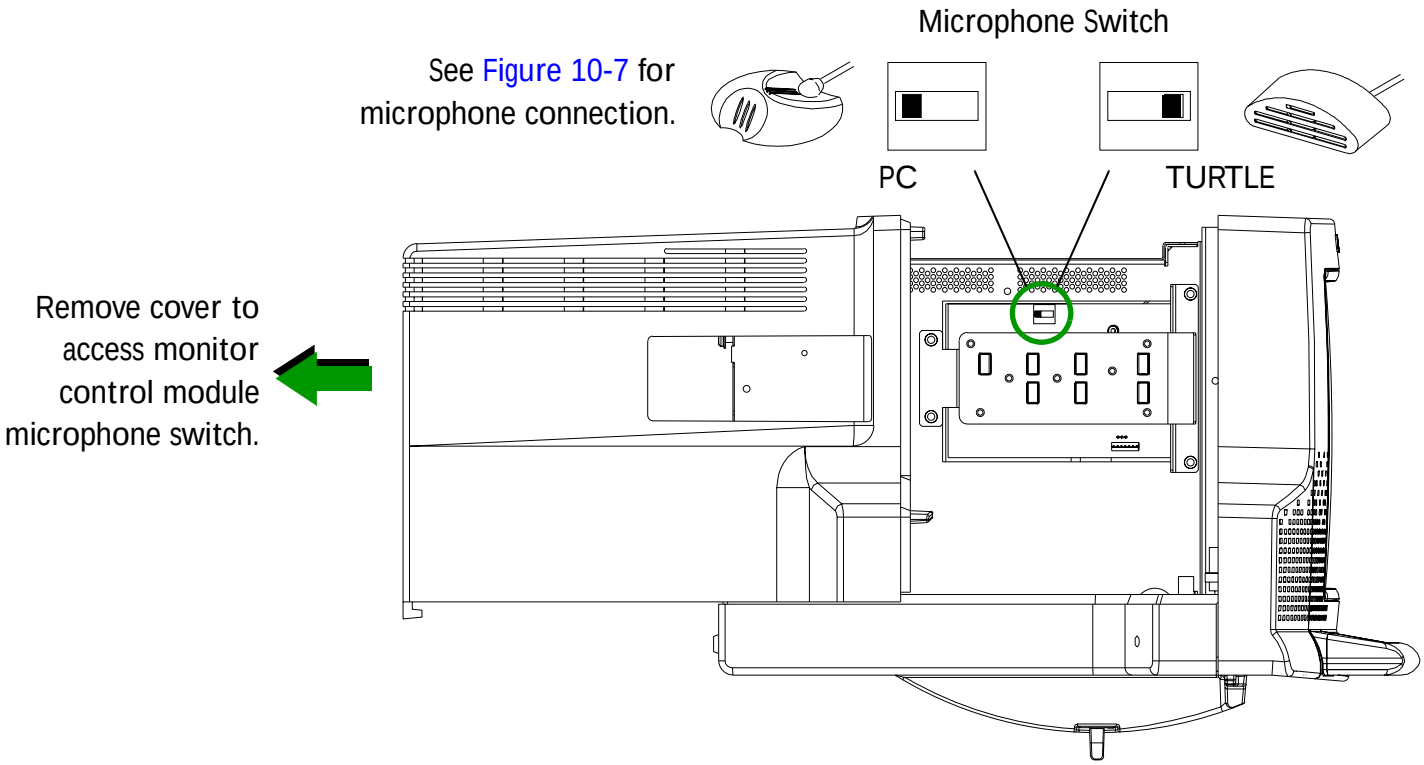
➤ **To set the monitor controls to user-defined settings**

1. Refer to the control locations in Figure 7-1 and adjust the contrast, brightness, color background, and lightbar brightness to the control settings desired by the user.
2. Wait 30 seconds before powering down the system to retain the factory default settings in the monitor EEPROM.

Monitor Microphone Switch Settings

The Monitor Control PCB has been redesigned for compatibility with the standard PC “Plug in Power” electret microphones. The monitor will also accept the Legacy HDI 3000/3500/5000 microphone assembly. Microphone selection is done using the switch located at the top of the Monitor Control PCB, (Figure 7-2). If the switch is in the wrong position for the microphone connected (i.e. PC position for the Legacy microphone), no audio will be captured by the microphone. However, no damage will occur to the microphone or the circuitry.

Figure 7-2 Monitor Control PCB Microphone Switch Selection (Philips Monitor Shown)



➤ **To set the microphone selection switch on the monitor control pcb**

1. Remove the top cover of the monitor (Figure 7-2).

NOTE It may be possible to change the switch position without removing the cover, but this is not recommended.

2. Set the switch to the “Turtle” position for the Legacy HDI 5000 type microphone.
3. Set the switch to the “PC” position for the commercially available microphones.

8 Troubleshooting

Introduction

The HDI 5000 Ultrasound System contains extensive software and hardware diagnostic capabilities. However, the system must boot up before the operator has access to diagnostics. This section contains information on the core bootup fault isolation procedure, system alerts, general fault isolation, and system diagnostics.

Core Bootup Fault Isolation

The HDI 5000 system requires the following PCBs for core bootup: ACIM, PSM, AIM+, UIM, IIM, PIM, PCM, SYSCPU, DDEA, and CTRBRD. It also requires the control interface module cables, the video cable, and the monitor for core bootup.

NOTE Core bootup may take up to 25 minutes if there are malfunctioning PCBs or missing PCBs.

➤ **The core bootup fault isolation procedure is as follows**

1. Set the ON/STANDBY switch to STANDBY and circuit breaker to OFF. Unplug the system power cord.

CAUTION Ensure the circuit breaker is set to OFF before removing PCBs.

2. Verify all card cage PCBs required for bootup (ACIM, PSM, AIM+, CPANEL, IIM, PIM, PCM, SYSCPU, and DDEA) are securely seated into the CTRBRD.
3. Verify all cables to the IIM and ACIM are properly connected.
4. Set the circuit breaker and the ON/STANDBY switch to ON.

5. If the system does not boot from the hard drive, insert the backup disk into the optical drive and attempt to boot the system from the optical drive. If the system does not bootup, continue with step 8.
6. If the system boots up from the optical drive, reload system software.
7. If reloading system software is not successful, replace the hard drive. The hard drive should be loaded with 107.10 software or higher.
8. If the system does not boot from the hard drive, turn the circuit breaker to OFF, and remove the PSP1, PSP2, FEC, IMEM, SPM, ADAPTR, AIFOM, CB0-7 (all Channel Boards), SHSEL, and Regulator Module. Reboot the system.

   If the system boots up with the PCBs removed, one of the removed PCBs was preventing other PCBs from accessing a bus. Replace the PCBs individually until you determine the faulty PCB.

NOTES

- It will take several minutes (up to 25 minutes) for the system to boot without the PSP1, PSP2, FEC, IMEM, SPM, ADAPTR, AIFOM, CB0-7 (all Channel Boards), SHSEL, and Regulator Module.
- With the FEC removed, the system will turn on, but not turn off. Use the circuit breaker to turn the system off.

9. Check the LEDs on each PCB. Refer to Figure 8-1, Figure 8-2, Table 8-1, and Table 8-2.

NOTE The system monitors the power supply enable voltages to ensure they are within tolerance. If the voltages are not within the tolerances listed in Figure 8-3, the system will shut down. If the system shuts down, none of the voltages will be enabled (all voltages will be 0V). If the system shuts down because of a power supply failure, check the PSM LEDs referring to Figure 8-1 and Table 8-2. Refer to Figure 8-3 and Figure 8-4**,** for PCB voltage locations.

Figure 8-1 Card Cage PCB LED Locations (Front)

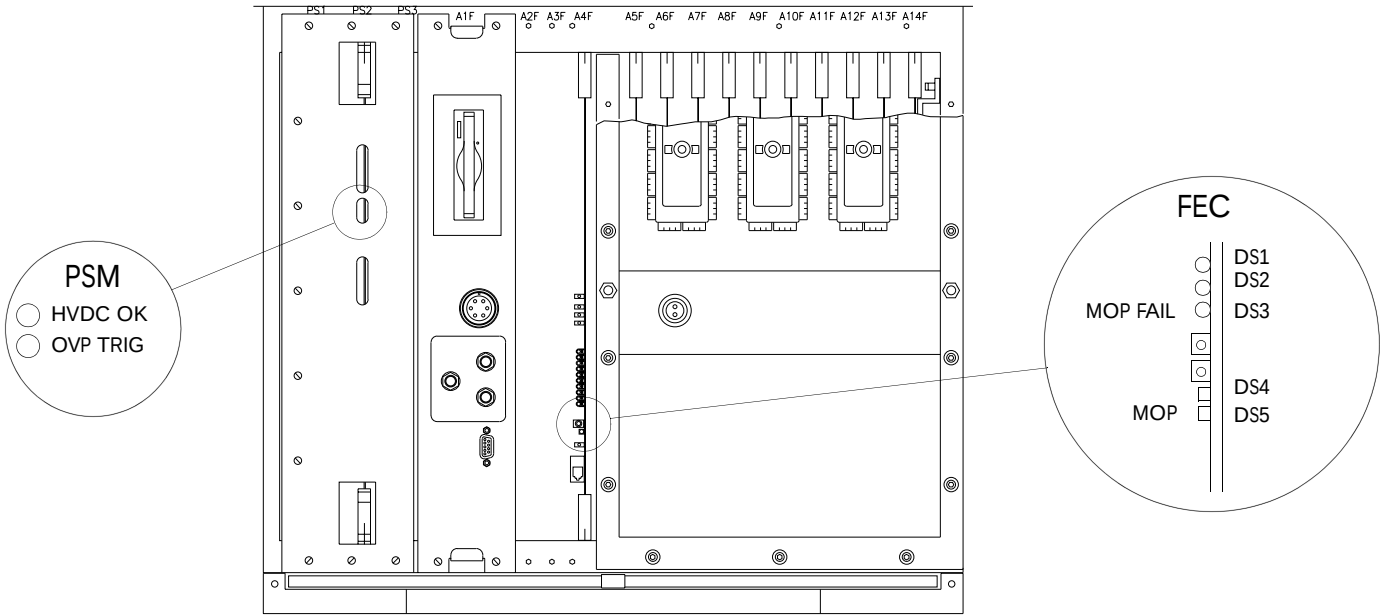


Figure 8-2 Card Cage PCB LED Locations (Rear)

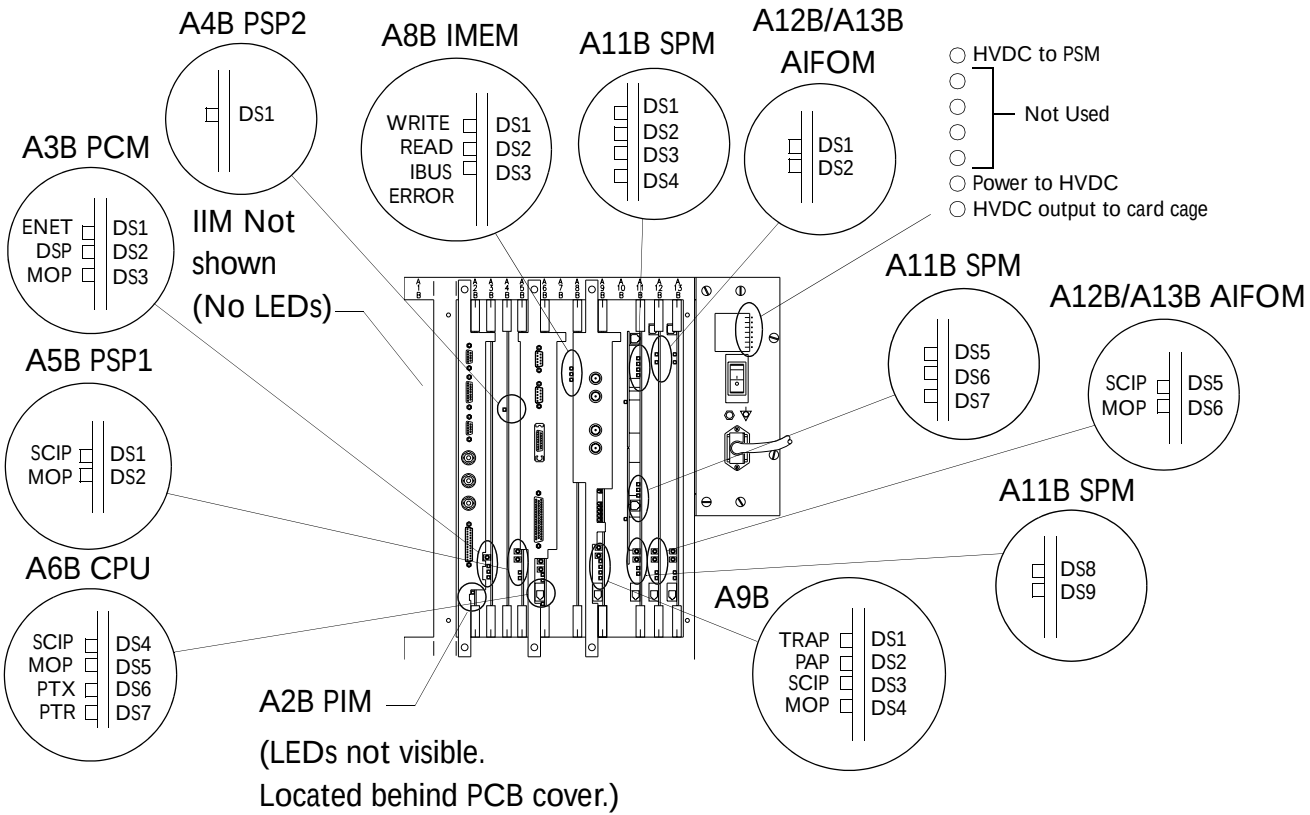


Table 8-1 Normal Core Bootup and PCB LED Sequence

Core Bootup Sequence	Field Replaceable Unit - Visual Indication[1]
Main power switch off, ON/STANDBY switch off • AC power to ACIM	ACIM - all LEDs off.
Main power switch on, ON/STANDBY switch off • HVDC to PSM • Connection made to ON/STANDBY switch	ACIM - LEDs #6 and #7 are lit continuously. #6 indicates power to HVDC transformer after internal fuse F1 (ACIM input). #7 indicates HVDC to PSM (ACIM output).
Main power switch on, ON/STANDBY switch on (system power on) • Individual power supply voltages are turned on 2-3 seconds after Main Power switch or ON/STANDBY switch is turned on • PCBs get power and begin initializing • PIM generates test pattern • CPNL, UIM, IIM, PIM, PCM data path established • HD loads applications and operating system to CPU • CPU completes bootup • CPU/PCM establish client/server (Ethernet) • PCM test pattern generated	CPNL - LEDs lit for 5 seconds, flash 4 times, then off. PCM - DS2 flickers, 1 Hz after 5 seconds. PIM - DS2 flickers, 1 Hz after 5 seconds CPU - SCIP quick flash, 1 Hz after 5 seconds. SCIP flickers at 1 Hz, MOP flickers at 2 Hz PCM - DS1 on, all others pulse Monitor - color test pattern, blank screen, gray pattern Subsystem PCBs - refer to Figure 8-2 for SCIP and MOP information Fans - full speed for 2 seconds, 3/4 speed until bootup, then controlled speed.

Table 8-1 Normal Core Bootup and PCB LED Sequence (Continued)

Core Bootup Sequence	Field Replaceable Unit - Visual Indication[1]
System Initialization	CPU - SCIP flickers at 1 Hz, MOP flickers at 2 Hz
• CPU begins loading subsystem PCBs	PCM - top LED stays on, all others pulse
• CPU/PCM client/server operational	Monitor - Splash screen
• HD/DDEA completes loading applications and operating system	SHSEL - relays energize. System bootup time is approx. 1.5 minutes
• IDs and configuration are checked	ACIM - LED #1 flickers at 1 Hz
• System operational files loaded and scanheads initialized	
Core bootup complete	Subsystem PCBs - refer to Table 8-2
• CPU using applications, SW, and MO files, checks configuration	Monitor - displays 2D image and static graphics (Static graphics displayed only if scanhead is connected to system during bootup)
• CPU checks bootup error status	
• UIF enabled	Fans - Fan speed depends on the card cage temperature averaged from 4 thermistors located on PCBs throughout the card cage. Correct fan voltage is sent from PSM to the fans (0 Vdc - +24 Vdc)

1. The sequence described is the normal sequence of events during core bootup. If these visual indications are not observed, refer to the "Core Bootup Fault Isolation" on page 207 procedure.

Table 8-2 PCB LED Functions and Status after Core Bootup

PCB	Slot Location	LED Status
Card Cage, Front		
PSM	PS1	DS1 - HVDC OK - Normally lit. Indicates that 155 Vdc is present to the PSM
	PS2	
	PS3	
FEC	A4F	DS2 - OVP TRIG - When lit, indicates that +6V or -6V have higher than normal voltage, or -5.2V current limiting has been activated (-5.2V circuits are drawing more than 14.3A).
		DS1 - not used
		DS2 - not used
		DS3 - MOP Fail - When lit, indicates MOP did not bootup
		DS4 - MOP LED[1]
		DS5 - SCIP LED[2]
Card Cage, Rear		
PIM	A2B	DS1 - Control panel interface processor LED
		DS2 - SCIP / MOP LED[1]
PCM	A3B	DS1 - Flickers when Ethernet communications with the CPU are active
		DS2 - DSP LED, flickers during image bus processing
		DS3 - MOP LED[1]

Table 8-2 PCB LED Functions and Status after Core Bootup (Continued)

PCB	Slot Location	LED Status
PSP2	A4B	DS1 - During power up, is momentarily on while its program is loaded from PSP1. After bootup, is an activity indicator (glows according to how busy the PSP2 is.) During high frame rates/color the LED should stay lit. Flickers when scan converting.
PSP1	A5B	DS1 - SCIP LED[2]
		DS2 - MOP LED[1]
CPU	A6B	DS1 through DS3 - not used
		DS4 - SCIP LED[2]
		DS5 - MOP LED[1]
		DS6 - PTX, flickers during Ethernet communications with CPU
		DS7 - PTR, flickers during Ethernet communications with CPU
		DS8 through DS11 - not used
IMEM	A8B	DS1 - Write LED, flickers during scanning
		DS2 - Read LED, flickers during scanning
		DS3 - IBUS ERROR LED, is normally off
ADAPTR	A9B	DS1 - TRAP (Translation Processor) LED, flickers in all scanning modes. In 2D or Doppler the rate is so fast, the LED appears constantly on. In Color the rate is visible
		DS2 - PAP (Physio-Audio Processor) LED, off in all modes
		DS3 - SCIP LED[2]
		DS4 - MOP LED[1]

Table 8-2 PCB LED Functions and Status after Core Bootup (Continued)

PCB	Slot Location	LED Status
SPM	A11B	DS1 through DS7 - not used
		DS8 - SCIP LED[2]
		DS9 - MOP LED[1]
		DS10 - not used (located behind DS5, DS6, and DS7)
		DS11 - not used (located behind DS5, DS6, and DS7)
AIFOM	A12B	DS1 - not used
	A13B	DS2 - not used
		DS5 - SCIP LED[2]
		DS6 - MOP LED[1], Blinks at one-second intervals during system bootup and two-second intervals when loading flash code.
ACIM	PS5	DS1 - After system bootup, flashes at approximately 1 Hz. Indicates HVDC to PSM after system bootup.
		DS2 - not used
		DS3 - not used
		DS4 - not used
		DS5 - not used

Table 8-2 PCB LED Functions and Status after Core Bootup (Continued)

PCB	Slot Location	LED Status
ACIM	PS5	DS6 - Normally lit (after system circuit breaker is set to on). Indicates power to HVDC after internal fuse F1.
		DS7 - Normally lit (after system circuit breaker is set to on). Indicates HVDC +155 Vdc from rectifier to card cage PCBs.

1. .The Module Operation Processor (MOP) controls PCB operation. The MOP LED blinks at one-second intervals during system bootup, and at a two-second rate after bootup.
2. .The Serial Communications Interface Processor (SCIP) communicates between the PCB and the CPU. The SCIP LED blinks at one-second intervals after bootup.

Figure 8-3 PSM Voltage Measurement Locations (PS1, PS2, PS3)

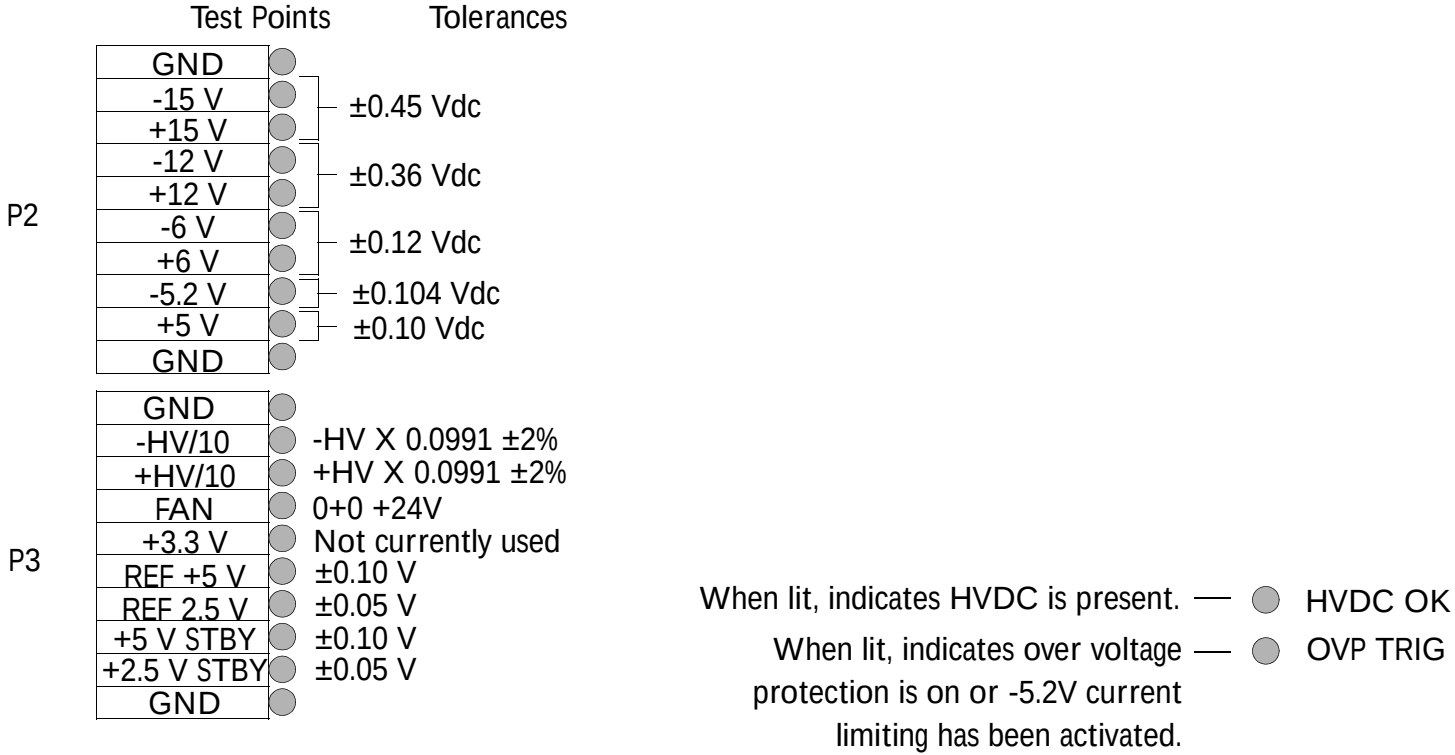
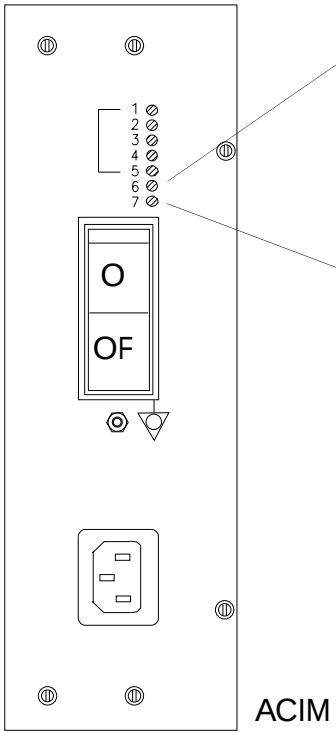


Figure 8-4 **ACIM Voltage Measurement Locations (PS5)**
3500-1578-02/03, 3500-1579-02/03, 3500-1580-01

CAUTION: Remove power to the system by disconnecting the power cord and wait 15 seconds before removing or replacing power supply PCBs. Otherwise, damage to PCBs and motherboard will result.

ACIM LED 1 indicates HVDC to PSM when the system has booted up

ACIM LEDs 2–5 are not used



ACIM LED 6 indicates power to HVDC after internal fuse F1 (12A 25VDC FB)

ACIM LED 7 indicates HVDC +155 Vdc from rectifier to PCBs

ACIM

Alert Information

Alerts indicate the system has detected a performance problem (Figure 8-5). These performance problems are caused by hardware faults or by system sensitivity to a particular series of key-strokes made by the operator. Alerts have a blue banner across the top of the dialog box.

➤ **To remove the alert from the display**

1. Simultaneously press Superkey and F6 (the sixth key to the right in the top row of keys on the lower user interface) to display a second page of error information (Figure 8-6).
2. Print or record the information on the second page. The second page of error information identifies the file and the line of software code containing the error.
3. Repeat step 1 to remove the alert message from the display and to continue scanning or other diagnostic procedures.
4. On systems with 170.XX software and up, press Superkey and Print to save the alert information to the hard drive for later retrieval with UpLink (version 2.0 or higher).

Figure 8-5 Typical Alert Message

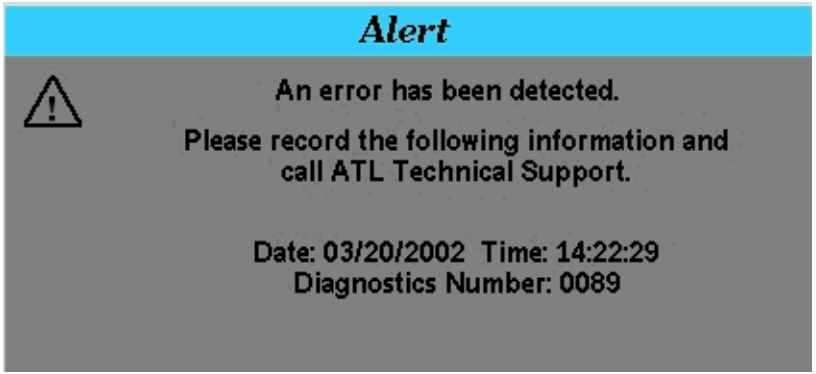

Alert
An error has been detected.
Please record the following information and call ATL Technical Support.
Date: 03/20/2002 Time: 14:22:29
Diagnostics Number: 0089

Figure 8-6 Alert with Second Page of Information Displayed

Miscellaneous Diagnostic Information

User Event Log

The user event log is helpful in determining the cause of system lockups by recording the sequence of user events (keystrokes or control activations) that resulted in the system lockup. The log records the last 500 keystrokes or control activations and the time they were entered from the system control panel. The event sequence is retained even if the system power switch and the circuit breaker are turned off. Any one of 10 pages of user events are displayed with 50 events on each page (2 columns of 25). The user events may include keystrokes, slidepot changes, control knob rotations, or trackball movements.

1. Verify the system has booted up.
2. Simultaneously press and hold the Superkey and Shift keys. Press the characters indicated in Table 8-3 to display the user event log for the desired language. Page 10 is displayed with the previous 50 events listed.

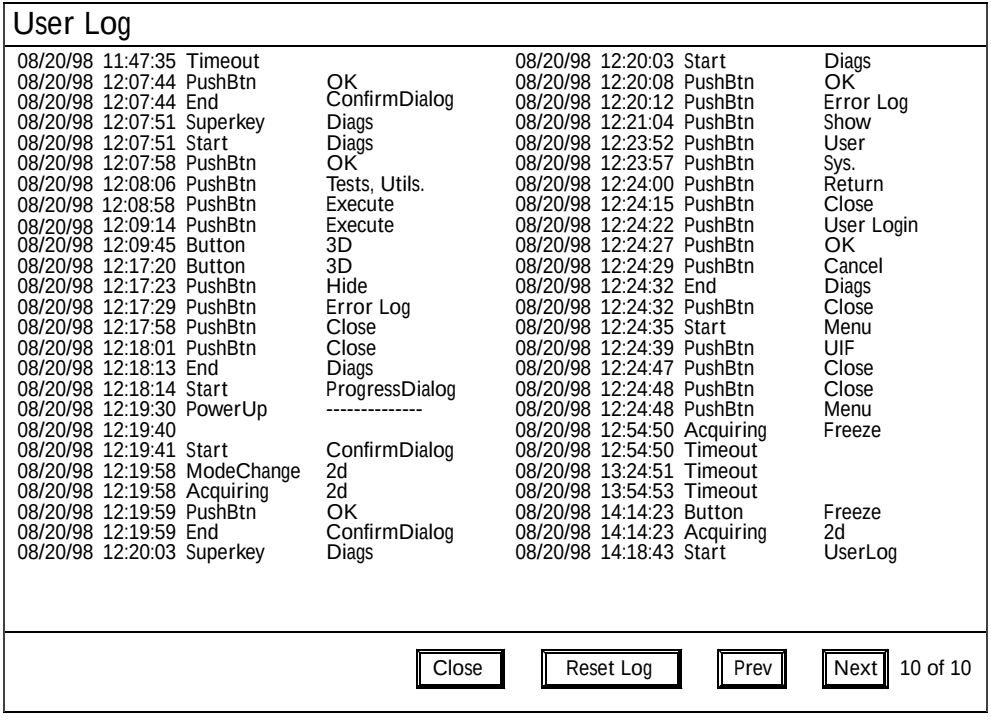
Table 8-3 User Event Log Language Differences

	Keystrokes Required		
Test	**English**	**French**	**German**
User Event Log	=	=	“spacebar”

3. Select the Next button on the bottom of the display to display the next page or the Prev button to display the previous page. Press SELECT. The display appears similar to Figure 8-7.
4. Select the Reset Log button to clear all entries from the event log. Press SELECT.

5. To exit, select the Close button on the bottom of the display. Press SELECT. The display returns to the previous imaging mode.

Figure 8-7 User Event Log



Formatting a Blank Optical Disk

➤ **To format a blank optical disk**

1. Boot up the system.
2. Verify DiskLink is enabled.

NOTE This procedure will not work without DiskLink.

3. Press NET/DISK.
4. Verify the blank optical disk is not write-protected (not write-protected = notch closed).
5. Insert the disk into the optical drive.
6. Select the Format Disk option displayed at the top left of the display. The optical drive LED will light during formatting.
7. Select the Eject Disk option to eject the formatted disk.
8. Press NET/DISK again to return to the previous imaging mode, or select Close at the bottom of the menu and press SELECT.

Formatting an Optical Disk/ Copying Presets

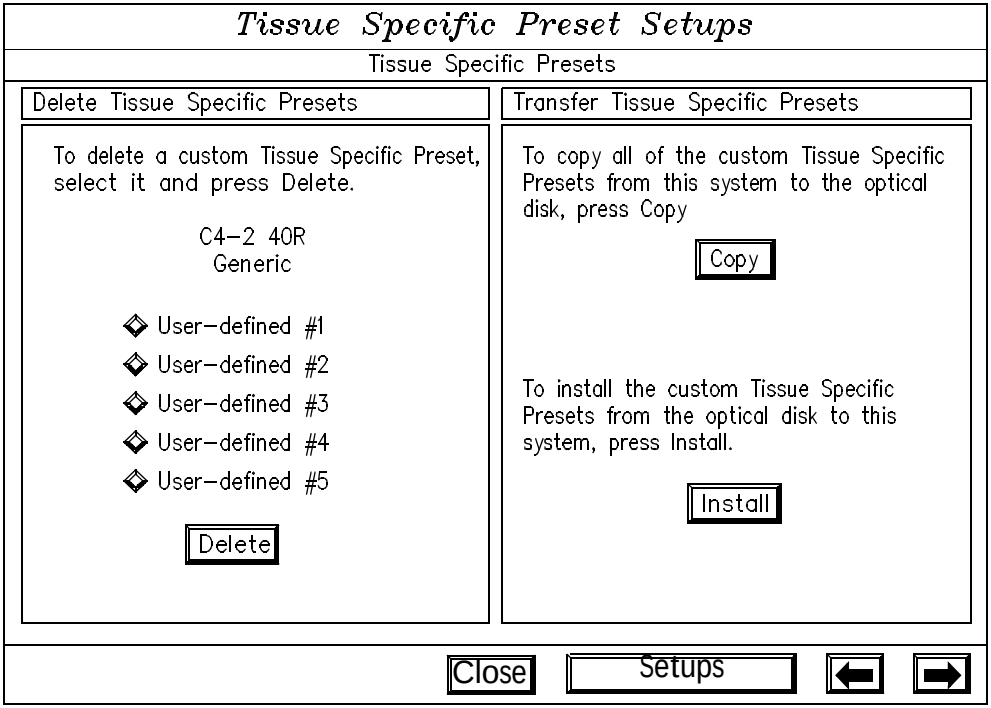
➤ **To format a blank optical disk and copy Tissue Specific Presets to the optical disk**

1. Boot up the system.
2. Press Setups. The Directory of Setup Options is displayed.
3. Verify the blank optical disk is not write-protected (not write-protected = notch closed).
4. Insert the disk into the optical drive.
5. Select Tissue Specific Presets. Press SELECT. The display appears as in Figure 8-8.
6. Select Copy and press SELECT. The process of formatting and copying the presets to the optical disk takes several minutes.

NOTE If the optical disk is not formatted, the system will display prompts asking you whether you wish to format it. If you choose to format, the prompts will also be displayed to guide you through the format procedure. If you have formatted the disk, repeat step 6 and continue with the procedure.

7. To copy the presets from the optical disk to the hard drive, select Install and press SELECT.

Figure 8-8 **Formatting Optical Disk/Copying Tissue Specific Presets**


Tissue Specific Preset Setups
Tissue Specific Presets
Delete Tissue Specific Presets
To delete a custom Tissue Specific Preset, select it and press Delete.
C4-2 40R
Generic
User-defined #1
User-defined #2
User-defined #3
User-defined #4
User-defined #5
Delete
Transfer Tissue Specific Presets
To copy all of the custom Tissue Specific Presets from this system to the optical disk, press Copy
Copy
To install the custom Tissue Specific Presets from the optical disk to this system, press Install.
Install
Close
Setups

Core Dump Utilities

The core dump utilities are used to simultaneously store error data to the hard disk and the optical disk, or to the hard disk only. This procedure is similar to the Remote Diagnostics procedure and applies to U.S. FSEs. Other service personnel should contact their respective Technical Support Group prior to performing the procedure.

➤ **To use the core dump utilities to backup data**

1. Verify the system clock is updating. (A sector or linear image is displayed.)
2. Verify the blank formatted optical disk is not write-protected (not write protected = notch closed).
3. Insert the blank disk into the optical drive. Refer to the Formatting a Blank Optical Disk procedure.
4. To write files first to the hard disk then copy them to the optical disk, refer to step a. To write files only to the hard disk, refer to step b.
   a. Simultaneously, press Superkey, Shift, and Text C. This procedure will take approximately 5 minutes. The LED on the optical drive will be lit continuously as the drive is storing data to the disk. The optical disk will be automatically ejected when the data transfer has been completed.

NOTE When performing this task, the system clock stops, and there is no dialog box or message displayed.

   b. Simultaneously, press Superkey, Shift, and Text D. This procedure will take approximately 3 minutes. The core files will be automatically transferred to an optical disk the next time the Remote Diagnostics procedure is performed.
5. Label the disk with the following information:
   - Service Order (S.O.) number
   - Machine ID number
   - Chassis ID number
   - Account name

- Install date
- FSE number

NOTE Mark your FSE number on the disk with an indelible marker. The disk will be returned for re-use.

6. Return the disk to the Technical Support Group at Bothell.

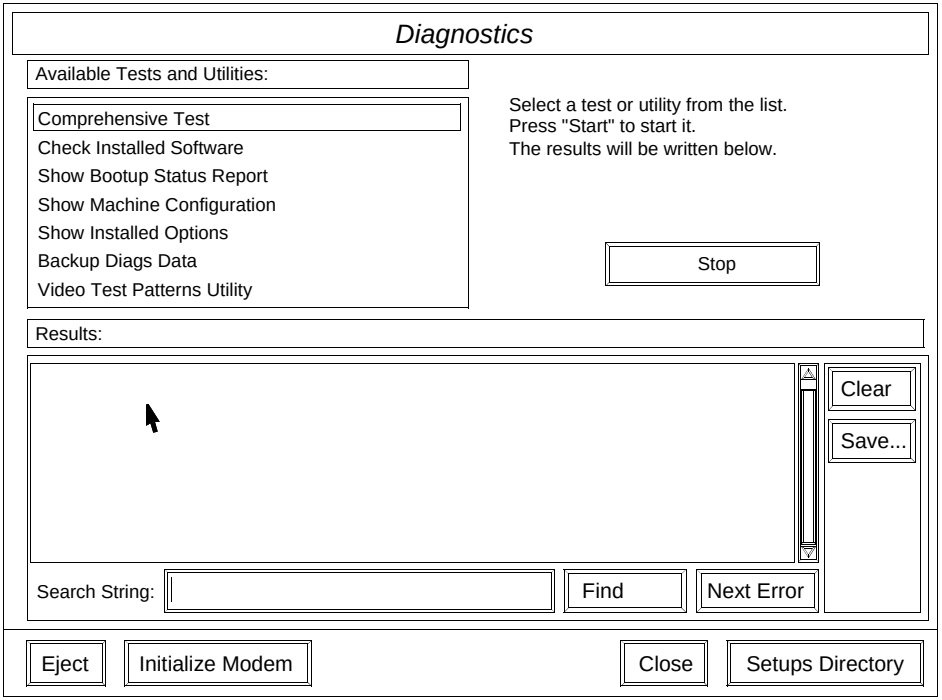
Accessing User Diagnostics

The user diagnostics enable the user to access several diagnostic capabilities. These capabilities enable the user to quickly diagnose system operational status or acquire the information needed to assist others in system diagnosis.

➤ **To access the user diagnostics**

1. Boot up the system.
2. Press Setups. The Directory of Setup Options is displayed.
3. Use the trackball to move the cursor to Diagnostics in the lower left corner of the display.
4. Press SELECT. The display appears as in Figure 8-9.
5. Move the cursor to the desired test or option. If the test or option is not highlighted with reverse video, press SELECT to highlight it.
6. Refer to the Comprehensive Test procedure to run the Comprehensive Test. For all other tests or options, move the cursor to Start and press SELECT to initiate or display the results. Information on the other tests and options is listed in “Comprehensive Test” on page 229 through “Remote Diagnostics” on page 246.

Figure 8-9 User Diagnostics Menu



Comprehensive Test

The Comprehensive Test (Figure 8-10) is used to determine system operational status. The test comprises numerous sub-tests. If a sub-test fails, the system completes the remaining sub-tests. When the Comprehensive Test has been completed, the results are displayed on the monitor.

If a sub-test fails, a failure code is displayed.

The Comprehensive Test should be run any time a system error is displayed, or if the user suspects problems with the system. If an error message is displayed during the test, reboot the system with the ON/STANDBY switch.

The test takes from 15 to 20 minutes to run, depending on which software version is installed in the system.

➤ To invoke the Comprehensive Test

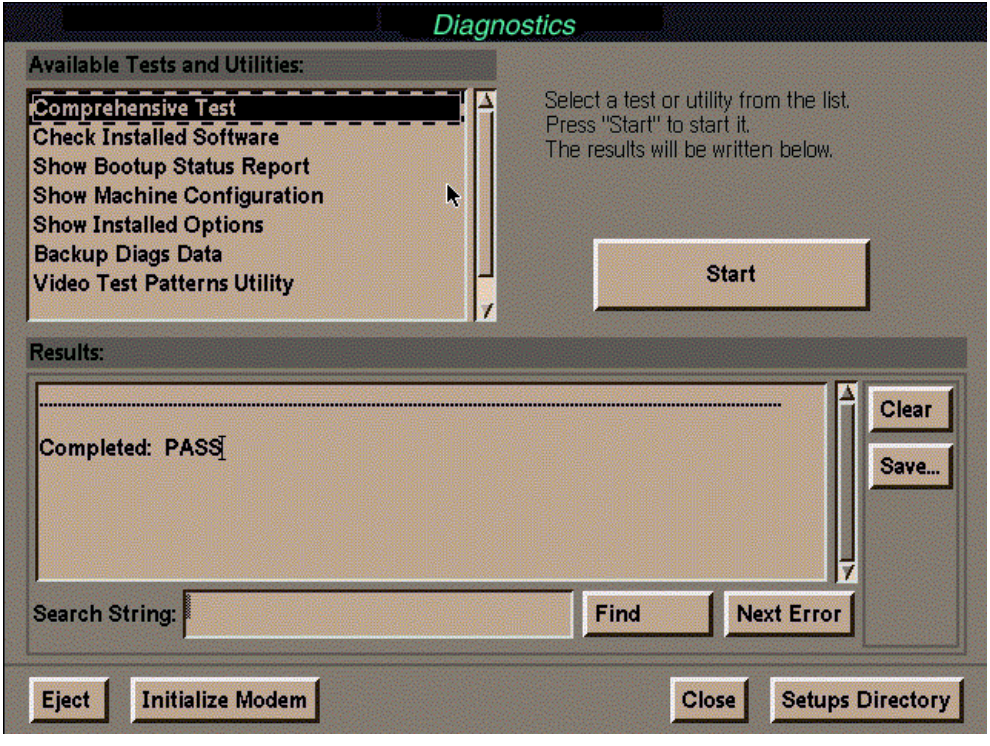
1. Verify there are no scanheads connected.
2. Perform step 1 through step 4 of Accessing User Diagnostics to access the Comprehensive Test.
3. Move the cursor to Comprehensive Test. If the Comprehensive Test is not highlighted with reverse video, press SELECT to highlight it.
4. Move the cursor to the START button. Press SELECT. A windowed message is displayed stating:

   This test will take more than fifteen (15) minutes. Also, the display will appear to be 'corrupted' at times (or blank) but it should return to normal after several minutes. Should I continue?
5. Move the cursor to the Continue button. Press SELECT. The test status is indicated by a row of "periods" across the results window. If a failure occurs, an error code is displayed.
6. To exit the Diagnostics Menu, use the trackball to select Close. Press SELECT. The following note is displayed:

NOTE System parameters have changed. It is necessary to reboot the machine before further scanning can be done.

7. Use the trackball to select the Reboot option. Press SELECT to reboot the system.

Figure 8-10 Comprehensive Test

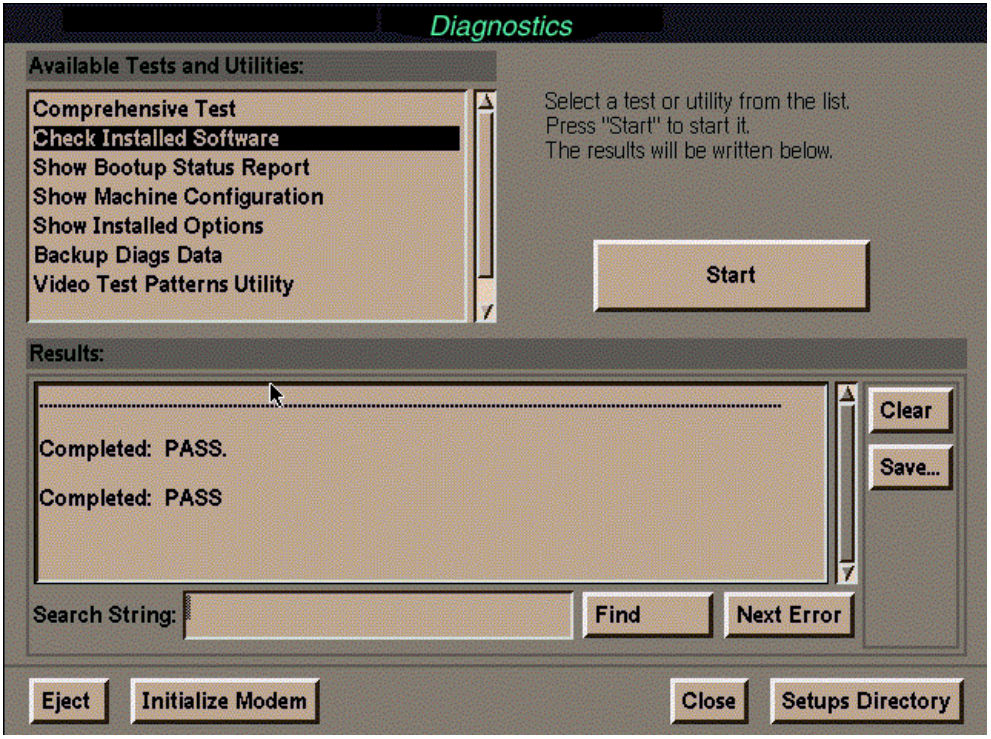


Check Installed Software

This test comprises Cyclic Redundancy Checks (also known as CRCs) of all read-only system software files (Figure 8-11). If a CRC fails, it may indicate a disk drive problem. If this is the case, re-install the system software and check the DDEA PCB.

1. Perform step 1 through step 4 of Accessing User Diagnostics.
2. Move the cursor to Check Installed Software.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT. A message is displayed stating, “Please wait, this process will take approximately 2 minutes.”
5. Use the trackball to select OK. Press SELECT. The Start button changes to a Stop button. When the test is complete, the results are displayed in the results window, and the Stop button turns into the Start button again. The results are displayed as “Completed: PASS” (or FAIL).
6. Press Stop to abort the test if needed.

Figure 8-11 Check Installed Software



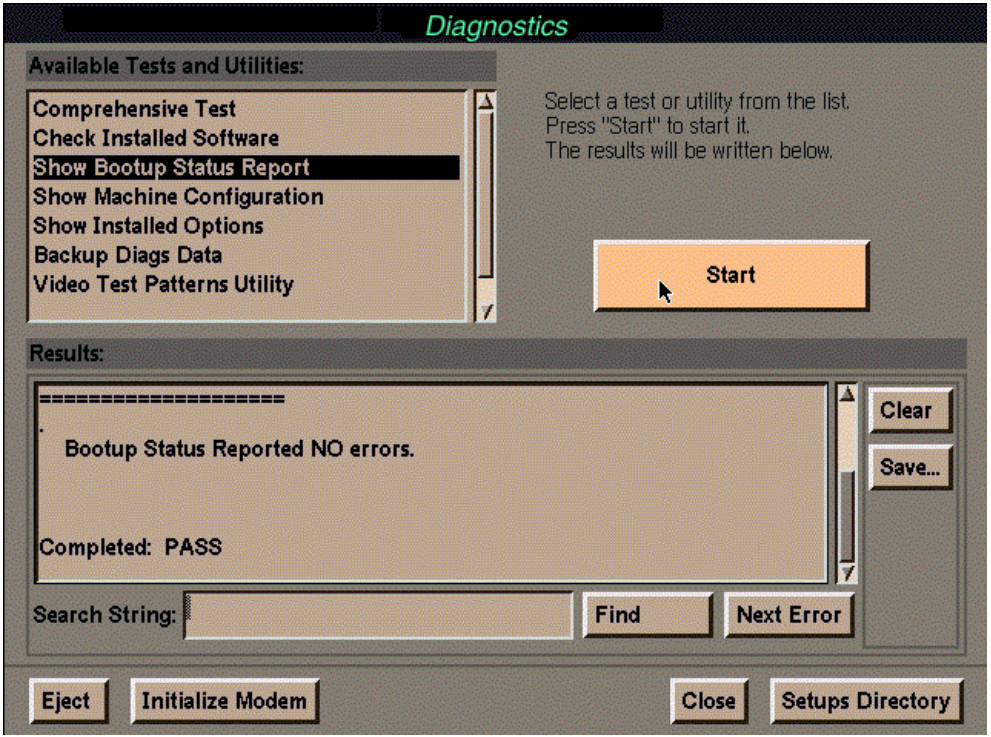
Show Bootup Status Report

During system bootup, the CPU queries the individual PCBs and displays the bootup status on the monitor (Figure 8-12).

1. Perform step 1 through step 4 of Accessing User Diagnostics.
2. Move the cursor to Show Bootup Status Report.

3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT to initiate the option. The system instantaneously displays a note stating the “Bootup status reported NO errors.” Test results are displayed as “Completed: PASS” (or FAIL).

Figure 8-12 Show Bootup Status Report



Show Machine Configuration

The Show Machine Configuration option displays the machine ID number, hard disk part number, and software version (software build) number. The machine ID number is a unique number assigned to each system and is programmed into a chip on the SYSCPU PCB. All machine options to be installed onto a particular system must contain the correct machine ID number for that particular system or no options will be enabled.

1. Perform step 1 through step 4 of Accessing User Diagnostics.
2. Move the cursor to Show Machine Configuration.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT to initiate the option. The results are displayed as:

   Machine ID: 0000005fXXXX

   Hard-Disk Software: 4252-0XXX-XX 1XX.XX (“X” indicates a numerical placeholder)

Show Installed Options

The Show Installed Options selection displays the system options that are installed on a particular system, whether those options were purchased when the system was ordered or for an upgrade. Refer to the COA (Customer Order Acknowledgement) for the customer ordered features, and check the installed options list for the options configured for the system. If there is a discrepancy, order a Machine Options Configuration disk for that particular system. Re-install the files from the new machine options disk onto the hard drive and check the configuration again.

1. Perform step 1 through step 4 of Accessing User Diagnostics.
2. Move the cursor to Show Installed Options.
3. Press SELECT to highlight the option with reverse video.
4. Move the cursor to Start. Press SELECT to initiate the option.

5. Refer to Table 8-4 for a list of the machine options possible with each released software version. Machine options will be added as the system matures through the product life cycle.

NOTE If there are no machine options listed for a particular software version, that software version is not listed in the following table.

Table 8-4 Machine Options/Software Build Compatibility Matrix

			Software Version												
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24					**Notes**
1.	8501-8523-01	English Language/UIF	●	●	●	●	●	●	●	●					
2.	8501-8524-01	German Language/UIF	●	●	●	●	●	●	●	●					
3.	8501-8525-01	French Language/UIF	●	●	●	●	●	●	●	●					
4.	8501-8523-03	English Language	●	●	●	●	●	●	●	●					
5.	8501-8524-03	German Language	●	●	●	●	●	●	●	●					
6.	8501-9648-01	Italian Language	●	●	●	●	●	●	●	●					
7.	8501-9645-01	Danish Language	●	●	●	●	●	●	●	●					
8.	8501-9646-01	Norwegian Language	●	●	●	●	●	●	●	●					
9.	8501-9647-01	Swedish Language	●	●	●	●	●	●	●	●					
10.	8501-9341-01	Finnish Language	●	●	●	●	●	●	●	●					
11.	8501-8525-03	French Language	●	●	●	●	●	●	●	●					
12.	8501-8533-01	Voltage/Video 120/NTSC	●	●	●	●	●	●	●	●					
13.	8501-8534-01	Voltage/Video 230/NTSC	●	●	●	●	●	●	●	●					
14.	8501-8536-01	Voltage/Video 230/PAL	●	●	●	●	●	●	●	●					
15.	8501-8536-02	Voltage/Video 230/PAL IEC-601-1	●	●	●	●	●	●	●	●					
16.	8501-9503-01	NTSC Video	●	●	●	●	●	●	●	●					

Table 8-4 Machine Options/Software Build Compatibility Matrix (Continued)

			Software Version												
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24					**Notes**
17.	8501-9504-01	PAL Video	●	●	●	●	●	●	●	●					
18.	8501-9432-01	Clin. Opt., Vasc: TCD	●	●	●	●	●	●	●	●					
19.	8501-9442-01	Clin. Opt., Vasc: Cerebro Vasc	●	●	●	●	●	●	●	●					
20.	8501-9433-01	Clin. Opt., Vasc: Peripheral	●	●	●	●	●	●	●	●					
21.	8501-9441-01	Clin. Opt., Vasc: Intraoperative	●	●	●	●	●	●	●	●					
22.	8501-9451-01	Clin. Opt., Vasc: CSI	●	●	●	●	●	●	●	●					
23.	8501-9513-01	Clin. Opt., Rad CSI	●	●	●	●	●	●	●	●					
24.	8501-9437-01	Clin. Opt., Genim: Abdomen	●	●	●	●	●	●	●	●					
25.	8501-9444-01	Clin. Opt., Advanced Breast	●	●	●	●	●	●	●	●					
26.	8501-9438-01	Clin. Opt., Genim: Small Parts	●	●	●	●	●	●	●	●					
27.	8501-9439-01	Clin. Opt., Genim: Prostate	●	●	●	●	●	●	●	●					
28.	8501-9440-01	Clin. Opt., Genim: Pediatric	●	●	●	●	●	●	●	●					
29.	8501-9436-01	Clin. Opt., OB	●	●	●	●	●	●	●	●					
30.	8501-9446-01	Clin. Opt., Neurosurgical	●	●	●	●	●	●	●	●					
31.	8501-9522-01	Clin. Opt., Abdominal Surgery	●	●	●	●	●	●	●	●					
32.	8501-9443-01	Clin. Opt., Musculoskeletal	●	●	●	●	●	●	●	●					

Table 8-4 Machine Options/Software Build Compatibility Matrix (Continued)

			Software Version												
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24					**Notes**
33.	8501-9435-01	Clin. Opt., Gyn/Fert	●	●	●	●	●	●	●	●					
34.	8501-9447-01	Clin. Opt., Card: CSI	●	●	●	●	●	●	●	●					
35.	8501-9497-01	Clin. Opt., Card: FCT	●	●	●	●	●	●	●	●					
36.	8501-9127-01	Clin. Opt., Harmonic Research	●	●	●	●	●	●	●	●					
37.	8501-9429-01	Clin. Opt., Card: Adult	●	●	●	●	●	●	●	●					
38.	8501-9430-01	Clin. Opt., Card: Ped/Fetal Echo	●	●	●	●	●	●	●	●					
39.	8501-9431-01	Clin. Opt., Card: Transesophageal	●	●	●	●	●	●	●	●					
40.	8501-8507-01	Extended Doppler Capability	●	●	●	●	●	●	●	●					
41.	8501-8507-02	Extended Doppler Capability EMI	●	●	●	●	●	●	●	●					
42.	8501-9425-01	Capability, CW2	●	●	●	●	●	●	●	●					
43.	8501-9426-01	Capability, CW5	●	●	●	●	●	●	●	●					
44.	8501-9427-01	Capability, CW10	●	●	●	●	●	●	●	●					
45.	8501-9428-01	Capability, TCD2	●	●	●	●	●	●	●	●					
46.	8501-9408-01	Capability, P3-2 20 mm	●	●	●	●	●	●	●	●					
47.	8501-9419-01	Capability, P4-2 20 mm	●	●	●	●	●	●	●	●					
48.	8501-9411-01	Capability, C9-5 ICT	●	●	●	●	●	●	●	●					

Table 8-4 Machine Options/Software Build Compatibility Matrix (Continued)

			Software Version												
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24					**Notes**
49.	8501-9412-01	Capability, C7-4 40R	●	●	●	●	●	●	●	●					
50.	8501-9413-01	Capability, C4-2 40R	●	●	●	●	●	●	●	●					
51.	8501-9424-01	Capability, C5-2 40R	●	●	●	●	●	●	●	●					
52.	8501-9417-01	Capability, L10-5 38 mm	●	●	●	●	●	●	●	●					
53.	8501-9416-01	Capability, L7-4 38 mm	●	●	●	●	●	●	●	●					
54.	8501-9414-01	Capability, CL10-5 26mm	●	●	●	●	●	●	●	●					
55.	8501-9409-01	Capability, P7-4 11 mm	●	●	●	●	●	●	●	●					
56.	8501-9407-01	Capability, P5-3 16mm	●	●	●	●	●	●	●	●					
57.	8501-9420-01	Capability, P6-3 28mm	●	●	●	●	●	●	●	●					
58.	8501-9518-01	Capability, CT8-4 40R	●	●	●	●	●	●	●	●					
59.	8501-9517-01	Capability, LI9-5 33mm	●	●	●	●	●	●	●	●					
60.	8501-9421-01	Capability, C8-4v	●	●	●	●	●	●	●	●					
61.	8501-9410-01	Capability, L12-5	●	●	●	●	●	●	●	●					
62.	8501-9422-01	Capability, C8-5 (Thomson)	●	●	●	●	●	●	●	●					
63.	8501-9418-01	Capability, MPT7-4	●	●	●	●	●	●	●	●					
64.	8501-9415-01	Capability, BPT9-5	●	●	●	●	●	●	●	●					

Table 8-4 Machine Options/Software Build Compatibility Matrix (Continued)

			Software Version													
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24						**Notes**
65.	8501-9394-01	Capability, L12-5 50mm	●	●	●	●	●	●	●	●						
66.	8501-9395-01	Capability, LAP L9-5	●	●	●	●	●	●	●	●						
67.	8501-9492-01	Color Power Angio Imaging	●	●	●	●	●	●	●	●						
68.	8501-9493-01	3D Color Power Angio Imaging	●	●	●	●	●	●	●	●						
69.	8501-9533-01	3D Grayscale	●	●	●	●	●	●	●	●						
70.	8501-9166-02	ResearchLink	●	●	●	●	●	●	●	●						
71.	8501-9167-01	On Board Diagnostics	●	●	●	●	●	●	●	●						
72.	8501-9499-01	Color M-Mode	●	●	●	●	●	●	●	●						
73.	8501-9498-01	Steered CW	●	●	●	●	●	●	●	●						
74.	8501-9500-01	Frame Grab	●	●	●	●	●	●	●	●						
75.	8501-9501-01	Triple Mode	●	●	●	●	●	●	●	●						
76.	8501-9502-01	TSI Patient Optimization	●	●	●	●	●	●	●	●						
77.	8501-9534-01	Auto Cardiac Output/VF	●	●	●	●	●	●	●	●						
78.	8501-9600-01	THI Optimization	●	●	●	●	●	●	●	●						
79.	8501-9593-01	TDI	●	●	●	●	●	●	●	●						
80.	8501-9606-01	Digital Echo			●	●	●	●	●	●						1

Table 8-4 Machine Options/Software Build Compatibility Matrix (Continued)

			Software Version													
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24						**Notes**
81.	8501-8703-01	Stress Echo			●	●	●	●	●	●						1
82.	8501-9641-01	A3DI Ready	●	●	●	●	●	●	●	●						1
83.	8501-9651-01	High PRF	●	●	●	●	●	●	●	●						
84.	8501-9652-01	Simultaneous 2D/CW	●	●	●	●	●	●	●	●						
85.	8501-9050-01	Auto Scaling	●	●	●	●	●	●	●	●						
86.	8501-9051-01	DICOM Scaling	●	●	●	●	●	●	●	●						
87.	8501-9494-01	DiskLink	●	●	●	●	●	●	●	●						2
88.	8501-9495-01	NetLink	●	●	●	●	●	●	●	●						
89.	8501-9496-01	WebLink	●	●	●	●	●	●	●	●						2
90.	8501-9742-01	Spatial Compounding (SonoCT)		●	●	●	●	●	●	●						
91.	8501-9774-01	3D Card Acquisition		●	●	●	●	●	●	●						
92.	8501-9775-01	Modality Worklist		●	●	●	●	●	●	●						
93.	8501-9833-01	Echo Multi-line (Intelligent Frame Rate Accelerator)			●	●	●	●	●	●						
94.	8501-9986-01	Capability, C8-5, ATL	●				●	●	●	●						
95.	8501-9765-01	Capability, CL15-7				●	●	●	●	●						

Table 8-4 Machine Options/Software Build Compatibility Matrix (Continued)

			Software Version													
	Part Number	**Description**	127.13	170.31	177.13	190.10	195.25	198.06	200.23	200.24						**Notes**
96.	8501-9984-01	Capability, Panoramic Imaging				●	●	●	●	●						
97.	8501-9985-01	Capability, Advanced 3D				●	●	●	●	●						
98.	8501-1183-01	XRES Image Processing					●	●	●	●						
99.	8501-1184-01	Assisted Border Detection					●	●	●	●						
100.	8501-8775-01	Modality Worklist					●	●	●	●						
101.	8501-1187-01	Capability, BPTRT9-5					●	●	●	●						
102.	8501-1341-01	Capability, P4-1						●	●	●						
103.	8501-9766-01	Capability, P12-5							●	●						
104.	8501-1397-01	HIPAA							●	●						
105.	8501-1483-01	iSCAN							●	●						
106.	8501-1186-01	Capability, Endo 12-5							●	●						
107.	8501-1344-01	2D Auto Optimization								●						
108.	8501-1345-01	Automated Doppler								●						
109.	8501-1540-01	Speed Up Option								●						3

1. A3DI must be turned off if Digital Echo or Stress Echo are enabled.
2. DiskLink and WebLink will be enabled, but will not function when used with DVS option
3. Speed Up option is used on Philips HDI 5000 systems (10.5.1 hardware and 200.24 software).

Backup Diags Data

This option saves the error log, the results of the last Comprehensive Test, the user event log, and other diagnostic information to a blank formatted optical disk. The Backup Diags Data option can be performed using UpLink by FSEs, or the following procedure by biomedical technicians and end-users. Questions about use of the procedure should be directed to the Technical Support Group.

Refer to Core Dump Utilities for a similar procedure, which allows you to store data on the optical or hard drives or both.

➤ **To backup the diagnostic data to an optical disk**

1. Perform step 1 through step 4 of Accessing User Diagnostics.
2. Move the cursor to Backup Diags Data. Press SELECT. The Backup Diags Data option is highlighted with reverse video.
3. Verify the blank formatted optical disk is not write-protected (not write-protected = notch closed).
4. Insert the blank disk into the optical drive. Refer to the Formatting a Blank Optical Disk procedure.
5. Move the cursor to Start. Press SELECT. The results are displayed as “Completed: PASS.” The process takes approximately 20 seconds to complete.

NOTE If a disk has not been inserted in the drive, a dialog box is displayed. The LED on the optical drive is lit, and the Start button changes to Stop while data is being transferred, however, the Stop function has not been implemented.

6. Move the cursor to Eject in the lower left of the display. Press SELECT to remove the disk from the drive.
7. Label the disk with the following information:

- Service Order (S.O.)
- Machine ID number (Base ID)
- Chassis ID number
- Account name
- Install date
- FSE number

NOTE Mark your FSE number on the disk with an indelible marker. The disk will be returned for re-use.

8. Return the disk to the Technical Support Group.

Video Test Patterns Utility

The Video Test Pattern Utility is used to isolate monitor, printer, and VCR video problems.

1. Perform step 1 through step 4 of Accessing User Diagnostics.
2. Move the cursor to Video Test Patterns Utility. The option is highlighted with reverse video.
3. Move the cursor to Start. Press SELECT. A note is displayed stating:

   The test patterns will be displayed one at a time. Press the spacebar to view the next pattern, 1 through 0 to view a specific pattern, or any other key to quit.
4. Move the cursor to OK. Press SELECT. A grayshade test pattern is displayed.
5. Use the spacebar to move through the individual test patterns, or refer to the test pattern numbers in Table 8-5 and press the appropriate number to obtain the desired test pattern.

Table 8-5 Video Test Patterns

Test Pattern Number	Description
1	Sixteen grayshade bars displayed vertically. White bars on left, black on right
2	Eight color bars displayed vertically. White, yellow, light blue, green, purple, red, dark blue, and black
3	Cross hatch pattern. Black background, with white grid
4	Entire screen displays the letter “y” in every character position. White letters on a black background
5	Quartered display with circle in the center of the display. Black background with white pattern
6	Quartered display with circle in the center of the display. White background with black pattern
7	White rectangle on black background
8	White screen
9	Flat black screen
0	Flat black screen with grid of white dots

Remote Diagnostics

The HDI 5000 system has a full suite of remote diagnostic capabilities. Contact your local technical support center for more information.

9 Disassembly

WARNING

Always turn power off, disconnect the main power cord from the wall outlet, and wait at least 30 seconds before removing or installing any PCB, module, or component.

CAUTION

Always use correct ESD procedures. ESD damage is cumulative and may not be noticeable at first. ESD symptoms may be first exhibited as a slight degradation of performance or image quality.

NOTE Do not pull and reinsert PCBs or other modules while main circuit breaker is ON. To reset PCBs, use the reset button provided on the card edge of many modules.

Card Cage PCBs and Modules

➤ **To remove most PCBs and modules**

1. Turn off the system circuit breaker and disconnect power cord.
2. Remove covers as necessary to gain access to the part requiring replacement.
3. Loosen captive screws on those boards with shields, or loosen the retaining clips as necessary.

CAUTION

Several modules require that adjacent modules be removed in order to provide ease of removal or allow correct alignment. For example, remove the PIM to correctly align the IIM module by hand to prevent misalignment of the PCB and centerplane.

➤ To remove the IIM

1. Remove the right side panel in addition to rear panel.
2. Remove all cable connectors from both the IIM and PIM.
3. Remove modules immediately to the right (to slot A3B).
4. Remove the IIM.

➤ To insert the IIM

1. Remove both modules immediately to the right (to slot A3B).
2. Use your right hand to align the IIM with the card guides and to ensure the connectors mate correctly with the centerplane.

CAUTION

Use caution when inserting the IIM into the centerplane. If connector pins are bent during insertion of the IIM, damage to the IIM or centerplane may result.

3. Replace the PIM and PCM.
4. Tighten all fasteners to ensure proper EMI/RFI shielding.

Monitor

NOTE Always place the monitor on its back to prevent damage to the locking tabs when the monitor is not installed on the system. (Four plastic feet are on the back of the monitor.)

➤ To install the monitor

1. Turn off the system circuit breaker and disconnect power cord.
2. Place the monitor on the system with the tabs inserted into the latching assemblies.
3. Slide the retaining levers forward to engage the locking tabs.
4. Rotate the retaining levers out and up to secure the monitor.
5. Connect the video/audio (monitor signal) cable and engage the slide lock.
6. Connect the power cord to the monitor and rotate the cable lock to secure the connector to the monitor.

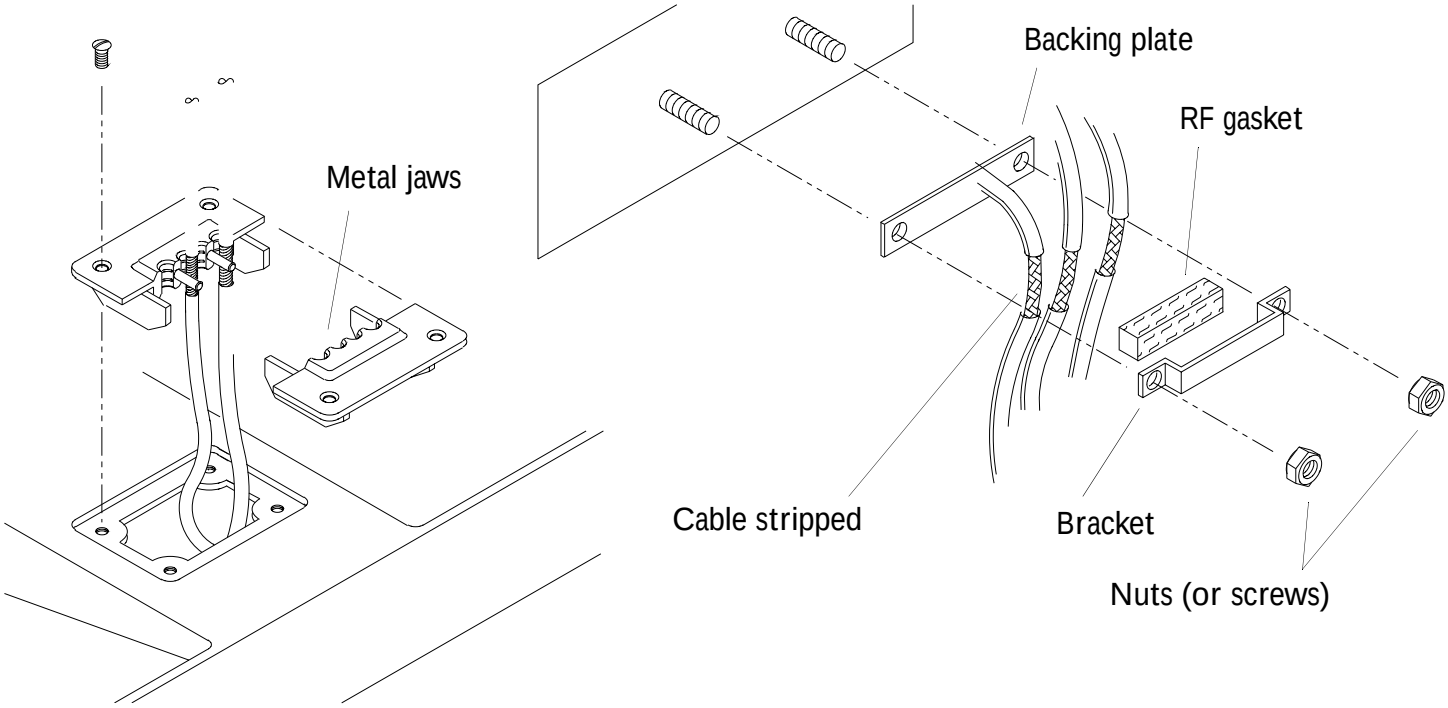
➤ To remove the monitor

1. Turn off the system circuit breaker and disconnect power cord.
2. Remove the VCR (HDI 5000 systems (classic) only).
3. Release the cable lock on the power cord connector on the lower rear of the monitor by rotating it to the rear of the system.
4. Disconnect the power cord from the monitor.
5. Slide the locking plate on the video/audio (monitor signal) cable to the left.
6. Disconnect the video/audio cable connector from the monitor.
7. Rotate down and slide to the rear the retaining levers under each side of the monitor to release the monitor tabs.
8. Lift the monitor up and off of the system.

➤ **To remove monitor cable clamps**

Refer to Figure 9-1 to remove the monitor cable clamps.

Figure 9-1 Monitor Cable Clamp Installation



Monitor Latching Labels

WARNING

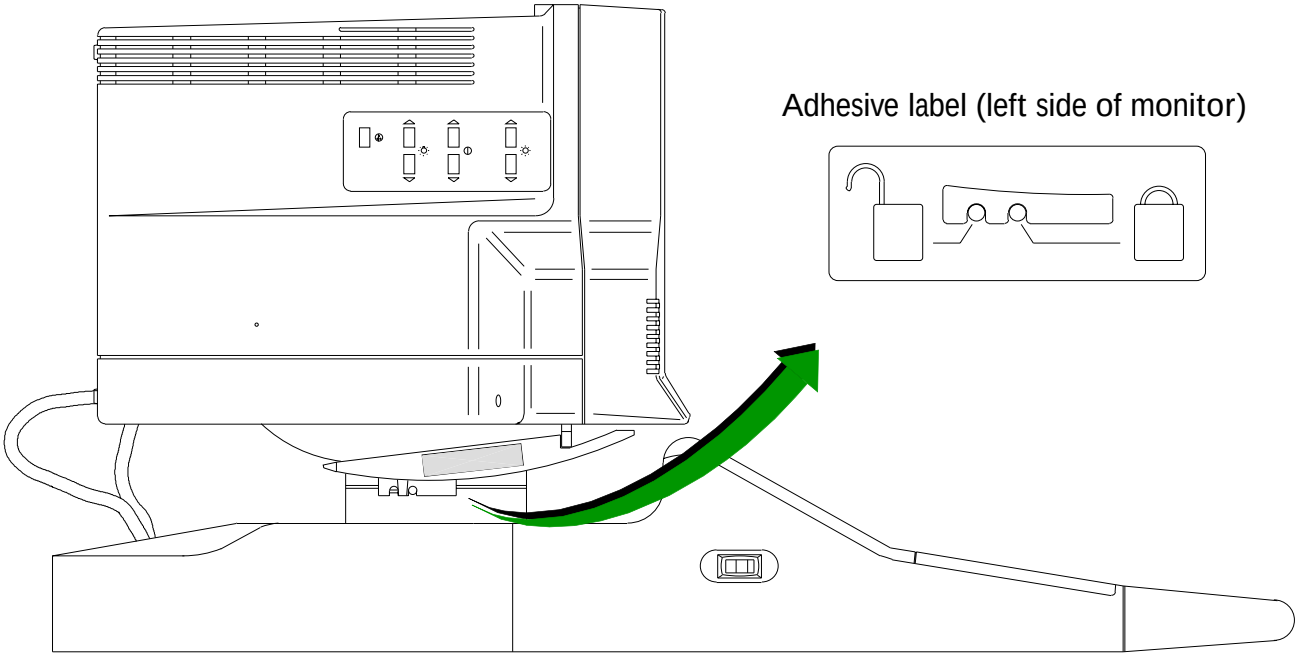
Monitors not properly secured with the monitor latches may fall off causing damage to the system or personal injury.

➤ **To apply monitor latching labels**

1. Use isopropyl alcohol to clean the area that will be immediately under the new label.
2. Remove the adhesive backing from the label and install the labels as in Figure 9-2.

NOTE The locked position is to the front of the monitor on both latches.

Figure 9-2 Monitor Latching Labels



Monitor Articulating Arm, Philips HDI 5000

Refer to "Monitor" on page 249 for instructions for removal of the video monitor before attempting to remove the articulating arm assembly.

➤ **To remove the articulating monitor arm on the Philips HDI 5000**

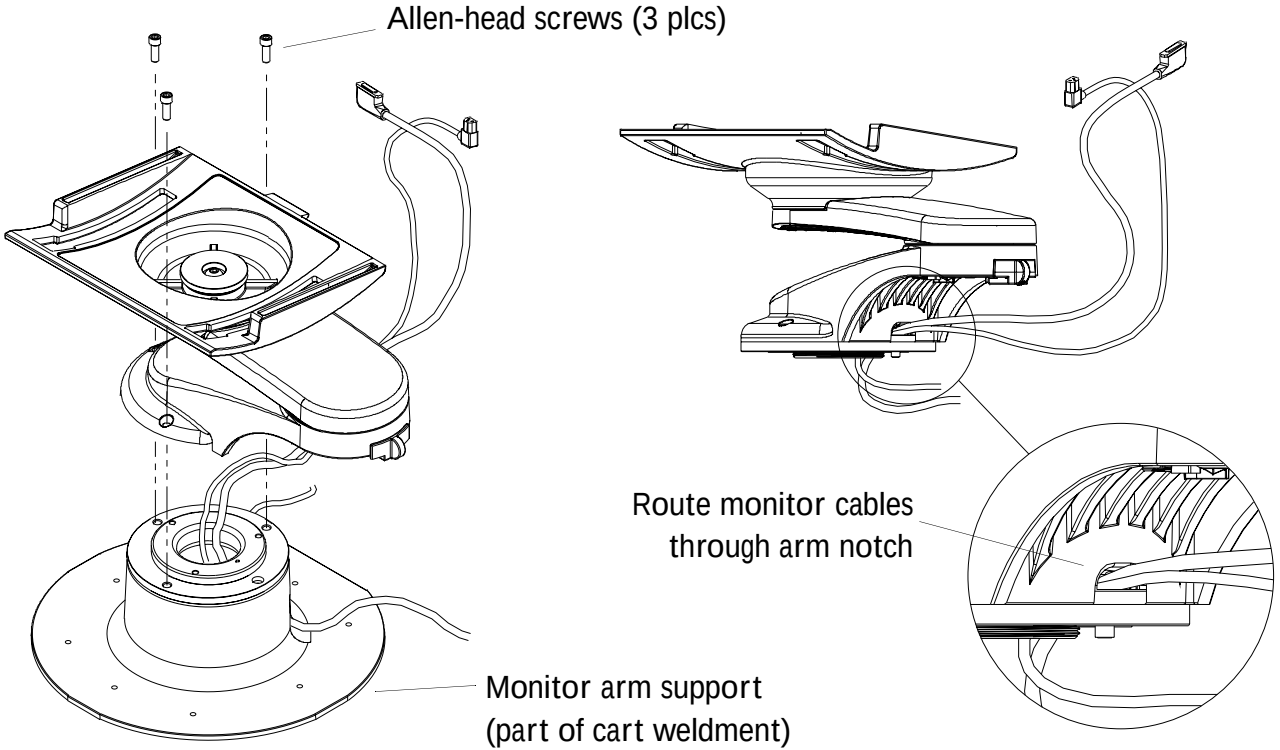
1. Remove video monitor.
2. Remove the three Allen-head screws securing the arm assembly to the support (Figure 9-3).

NOTE Support the arm assembly with one hand when removing the last screw, or the weight of the arm will cause it to topple over.

➤ **To Install the articulating monitor arm on the Philips HDI 5000**

1. Ensure the cords are properly routed thru the cable notch (Figure 9-3).
2. Support the arm assembly with one hand while installing the three Allen-head screws that secure the arm assembly to the cart support.
3. Ensure the arm is seated and the screws are snug.
4. Install the video monitor and reconnect the cables.

Figure 9-3 Articulating Monitor Arm Installation/Removal, Philips HDI 5000

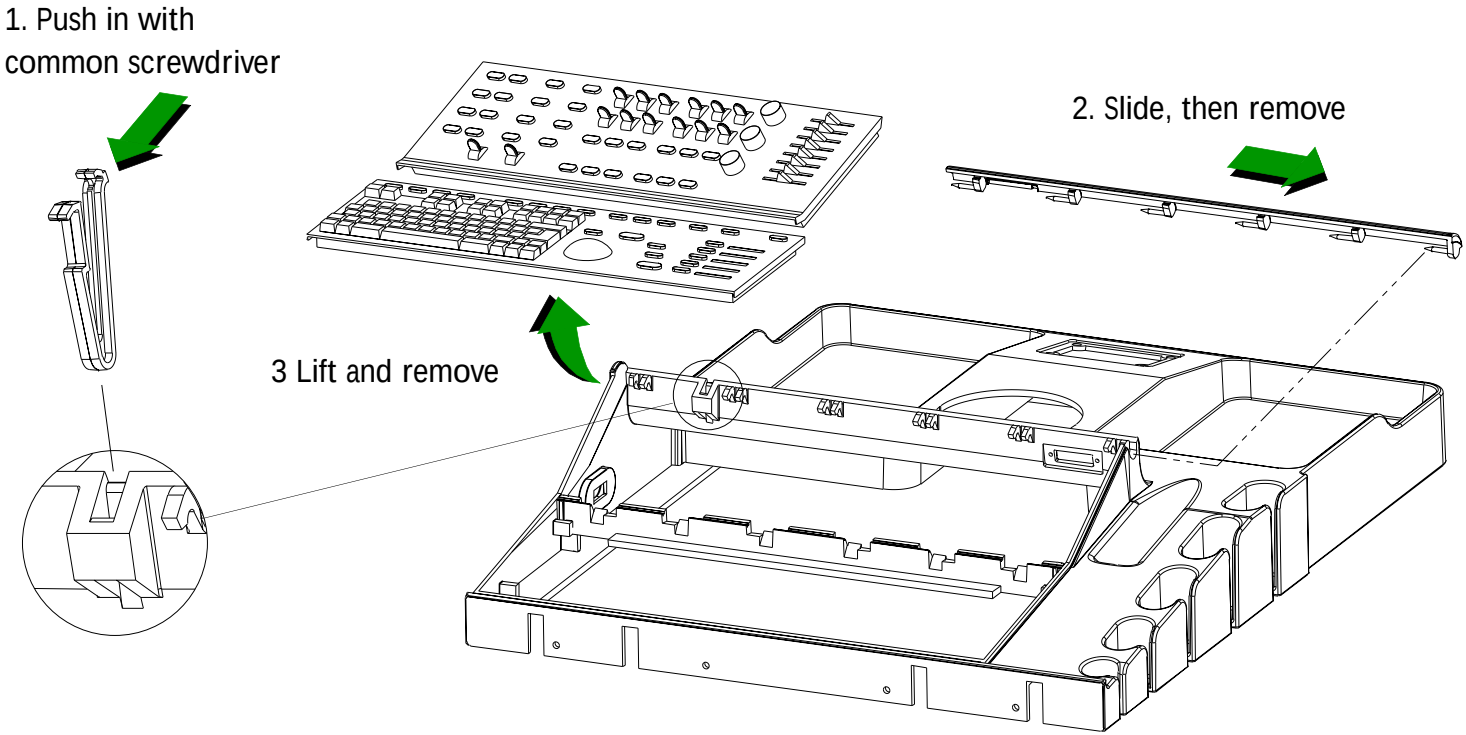


Control Panel PCBs and On/Standby Switch

➤ **To remove the Control Panel PCBs and On/Standby switch**

1. Turn off the system circuit breaker and disconnect the power cord.
2. Use a small, common screwdriver to push in the locking bar latch release on the left rear of the upper user interface assembly (step 1 in Figure 9-4).
3. Slide the lock bar to the right and remove it (step 2).
4. Lift the top edge of the upper user interface assembly and remove the assembly to gain access to the UIM or the lower user interface assembly (step 3).
5. Remove the Control Panel PCBs or the On/Standby switch as necessary.

Figure 9-4 Control Panel Details



Trackball

➤ **To replace the trackball**

1. Remove the upper and lower user interface assemblies by performing step 1 through step 4 of “To remove the Control Panel PCBs and On/Standby switch” on page 255.
2. Remove the old trackball and bracket.

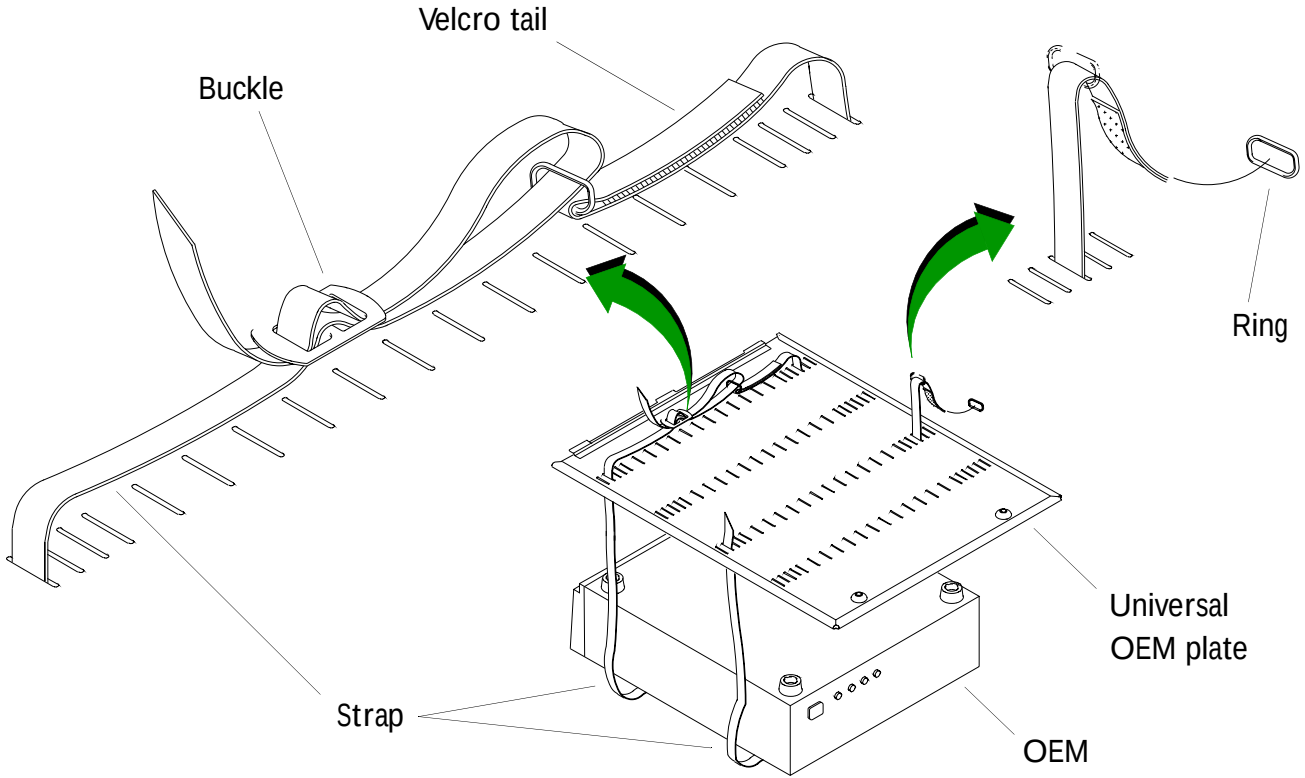
3. If using a new style trackball (P/N 2100-1505-01), carve away the inside corner of the PCB closest to the trackball cable connector using a utility knife. (Squaring-off the corner provides clearance for the new trackball.) If using an older style trackball, continue with step 6.
4. Verify the trackball moves freely and has a snug protective seal.
   a. Adjust the tension on the trackball by turning the trackball seal ring counterclockwise to loosen or clockwise to tighten. Wear a surgical glove to enhance your grip on the plastic ring.
   b. If the trackball movement is difficult, remove spacer rings by disassembling the trackball and removing rings as required.
5. Reassemble the user interface assembly.
6. Install the upper and lower user interface assemblies and the control panel lock bar.
7. Power up system.
8. Check the trackball for proper operation.

Internal OEMs

➤ **To install an Internal OEM**

1. Lay two straps on a flat surface; place OEM device upside down on straps (Figure 9-5).
2. Place OEM plate upside down on OEM. Refer to Figure 9-6 for OEM orientation.
   - Center the OEM between the sides of the tray with the captive screw to the rear of the OEM (Figure 9-5).
   - The front of the tray should slightly overhang the OEM.

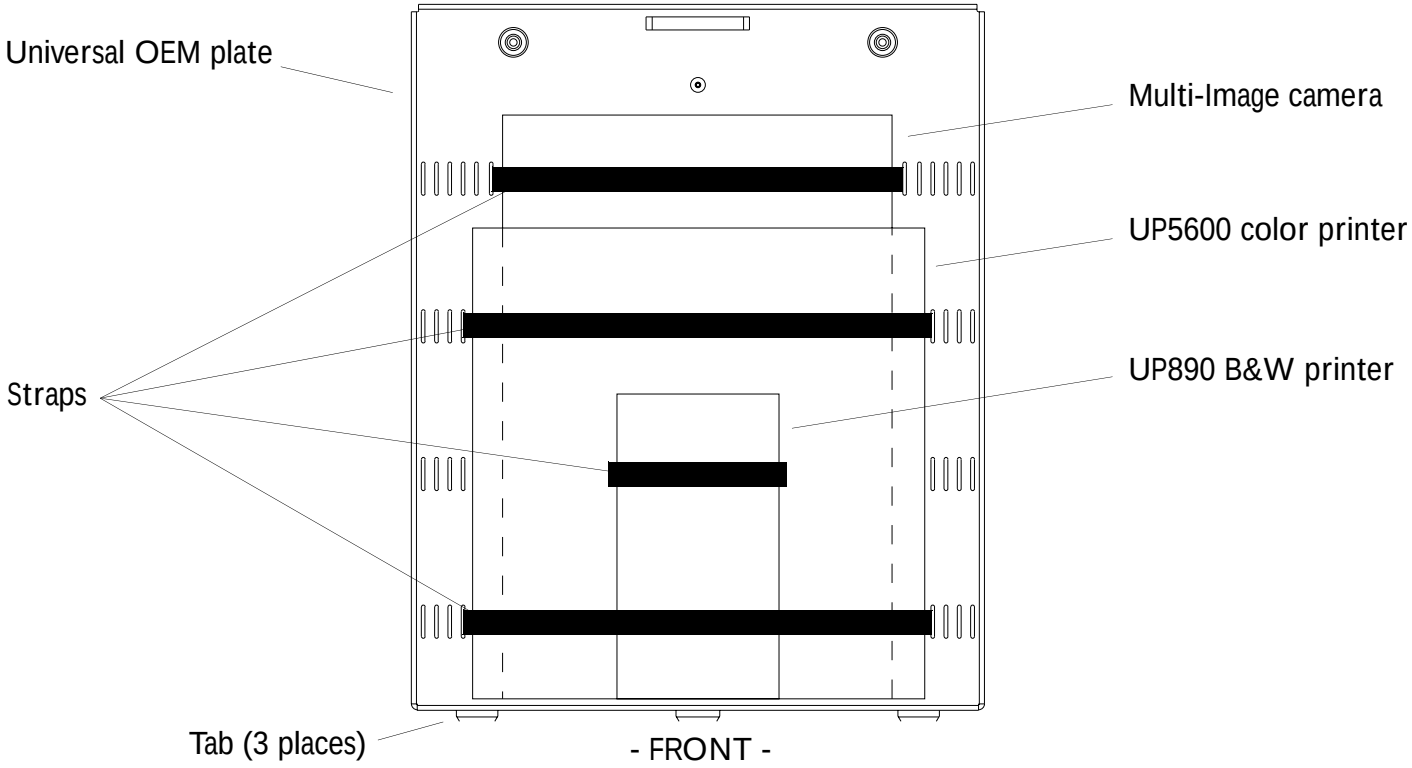
Figure 9-5 Internal OEM Installation (Strapping)



3. Pass straps through the first slots outside of the OEM with the ring, velcro, and buckle as shown.
4. Adjust buckle as tight as possible.
5. Loosen velcro, pull on both ends of the strap until snug, and reattach velcro.

6. Repeat step 5 for the remaining strap.
7. Secure tray in OEM bay with tabs in slots.

Figure 9-6 OEM Orientation on Universal OEM Plate



Scanhead Select Module Access, Philips HDI 5000

➤ **To access the Scanhead Select Module on the Philips HDI 5000**

1. Remove the four screws securing the system front cover and lift the cover off (Figure 9-7).
2. Remove the four screws securing the right card cage shield and set the shield aside.
3. Remove the two Philips-head screws securing the upper portion of the right front inner bumper (Figure 9-8).
4. Loosen but don't remove the Allen-head screw securing the bottom of the right front inner bumper.
5. Slide and remove the bumper from the cart frame.
6. To remove or install the Scanhead Select Module, refer to Figure 9-9.

Figure 9-7 Front Cover and Right Card Cage Shield Removal

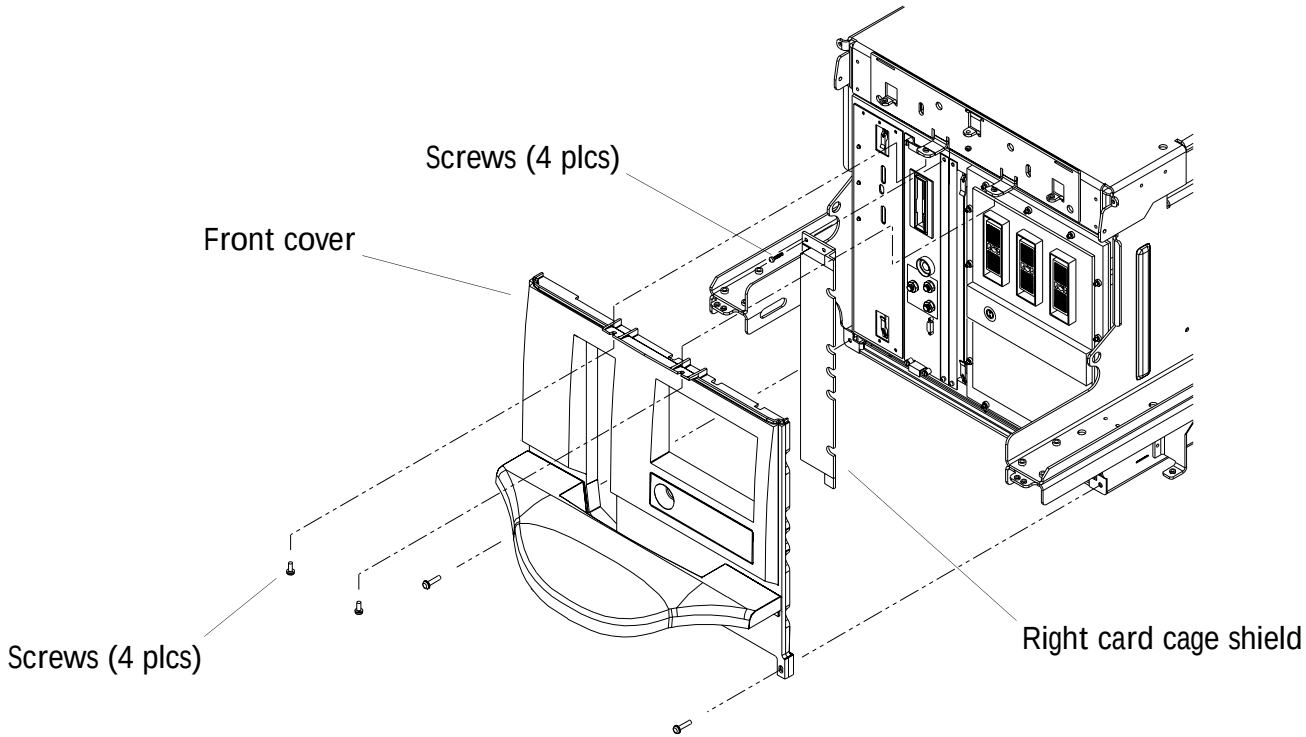
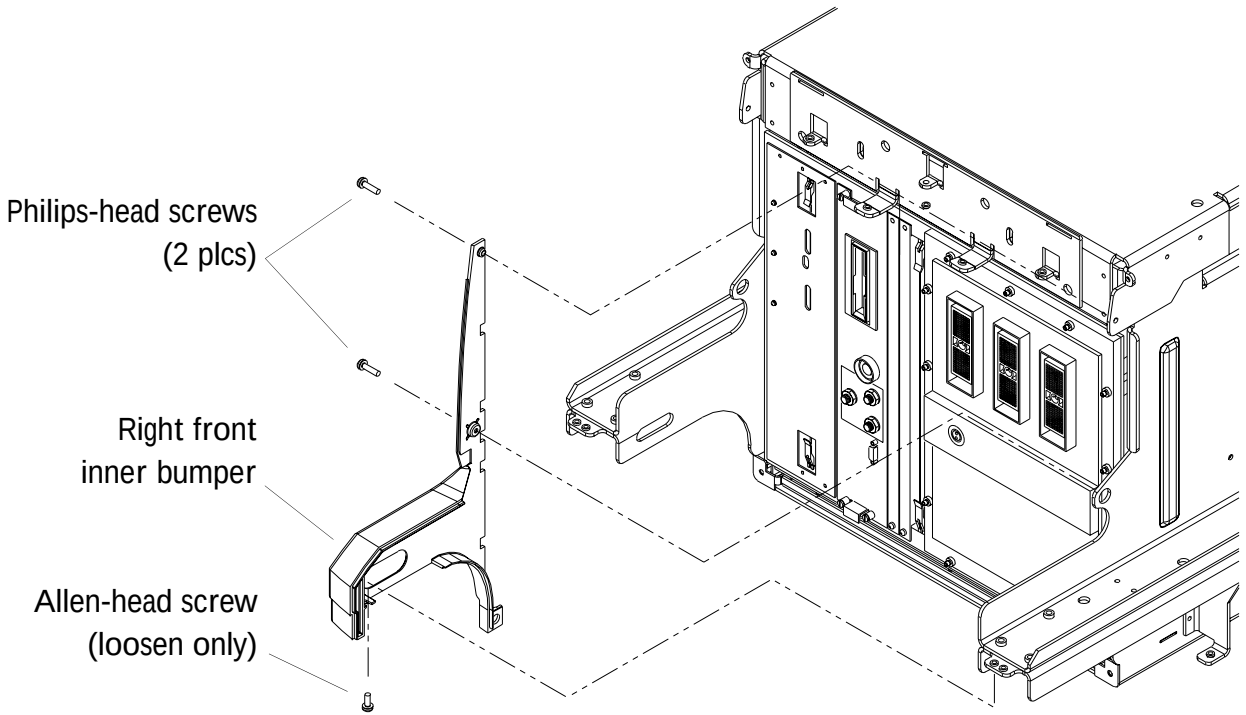


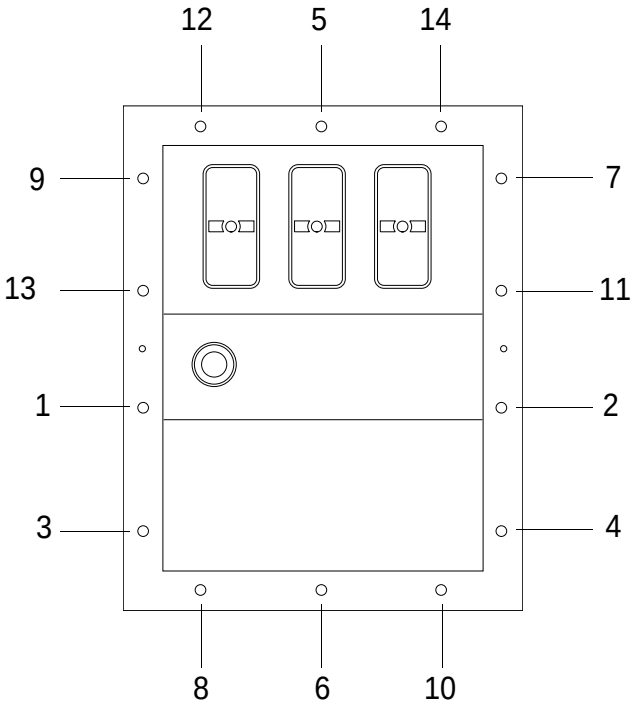
Figure 9-8 Right Front Inner Bumper Removal



Scanhead Select Module

Refer to Figure 9-9 for information on removing and installing the Scanhead Select Module.

Figure 9-9 S/HSEL Removal/Installation Details



Removal

1. In the reverse order shown, use a 7/64 Allen wrench to loosen screws 1 turn at a time. Repeat until all screws are loose.
2. Remove S/HSEL Module, and inspect for damage.

Installation

CAUTION: Carefully align the S/HSEL Module over the Channel Boards. Do not damage the RF gasket.

1. Hand tighten screws (P/N 1563-0258-01) in the order shown.
2. Use a 7/64 Allen wrench to tighten the screws an additional 1/4 turn in the order shown.

Hubcap Replacement

Hubcaps on older systems may fall off due to inadequate adhesive. Use the following procedure to replace hubcaps.

1. Remove adhesive tape from caster. Scrape with a dull blade if necessary.
2. Clean adhesive from caster using alcohol and let dry.
3. Carefully remove the adhesive liner from the new hubcap by pulling on the tab. If the tape starts to peel from the hubcap, peel using the other tab.
4. Verify that the tape is not wrinkled or torn. Replace damaged hubcaps.
5. Place the hubcap on the caster and apply firm pressure evenly on the hubcap for three to five seconds.

ECG Connector

Replace the ECG connector using the following procedure:

1. Remove the DDEA module from the system.
2. Remove the four screws securing the ECG connector to the DDEA bracket.
3. Unsolder the connector wires (blue, green, black and brown) attaching the ECG connector to the DDEA.
4. Remove and replace the ECG connector with connector P/N 3100-0274.
5. Insert the screws securing the connector to the bracket.
6. Assemble the DDEA and insert it in the system.
7. Verify ECG operation.

Transceiver Retaining Clip

The network transceiver may be loose or have an intermittent connection to the system. This may cause intermittent network connections or “0084” error messages. Order kit part number 2950-0615-01 and replace the transceiver retaining clip using the following procedure:

➤ **To replace the transceiver retaining clip**

1. Locate the clip on the E-net connector on the CPU PCB.
2. Loosen (but do not remove) both screws on the “D” connector.
3. Slide the old clip off the screws.
4. Position the new clip with the most open side toward the PCB and with the small screw hole to the top.
5. Slide the clip over the screws.
6. Tighten the screws and verify that the slide works.
7. Verify that the transceiver can be securely attached to the CPU.
8. If other parts need to be replaced, remove the PCB from the card cage to replace them.

Transceiver Support Bracket

If the transceiver is not properly supported, network communications may be interrupted. On systems with a metal rear cover that has network communication problems, order P/N 1065-5704-01 to replace the rear cover. On systems with a plastic rear cover, install a transceiver support bracket using the following procedure.

➤ **To install a transceiver support bracket**

1. Disconnect cabling and remove the rear panel.
2. If the panel has holes for the support bracket, proceed with step 8 to install the bracket.If the panel does not have holes continue with step 3.
3. Mark the holes on the cover using a template.
   - Metal template: Order P/N 1200-0355-XX.
   - Paper template (Figure 9-10): Verify the dimensions are as indicated before cutting out the template and using it.

4. Place the template on the rear panel as shown in Figure 9-11.
5. Drill 1/8-inch (3.2 mm) pilot holes in each hole location, remove the template, and re-drill with 1/4-inch (6.4 mm) drill bit.
6. Remove the material vertically between the holes.
7. Using an indelible pen, re-mark the rear panel part number.
   - On systems with four swivel casters, change the number to 1065-2892-04 (from 1065-2892-03).
   - On systems with two swivel casters, change the number to 1065-5704-01 (from 1065-2892-02).
8. Insert the stud bracket into the cover Figure 9-12.
9. Install the support bracket over the studs.
10. Loosely install the KEPS nuts on the studs.
11. Install the rear panel.
12. Clean the bracket and the transceiver with isopropyl alcohol.
13. Remove the adhesive strips from the Velcro. Attach the Velcro to the bracket and the transceiver. (Keep the Velcro halves separated.)
14. Connect the transceiver to the PCB connector and secure it with the retaining clip.
15. Snug the bracket to the PCB and secure the Velcro halves to each other.
16. Tighten the KEPS nuts.
17. Verify system operation.

Figure 9-10 Transceiver Support Bracket Template

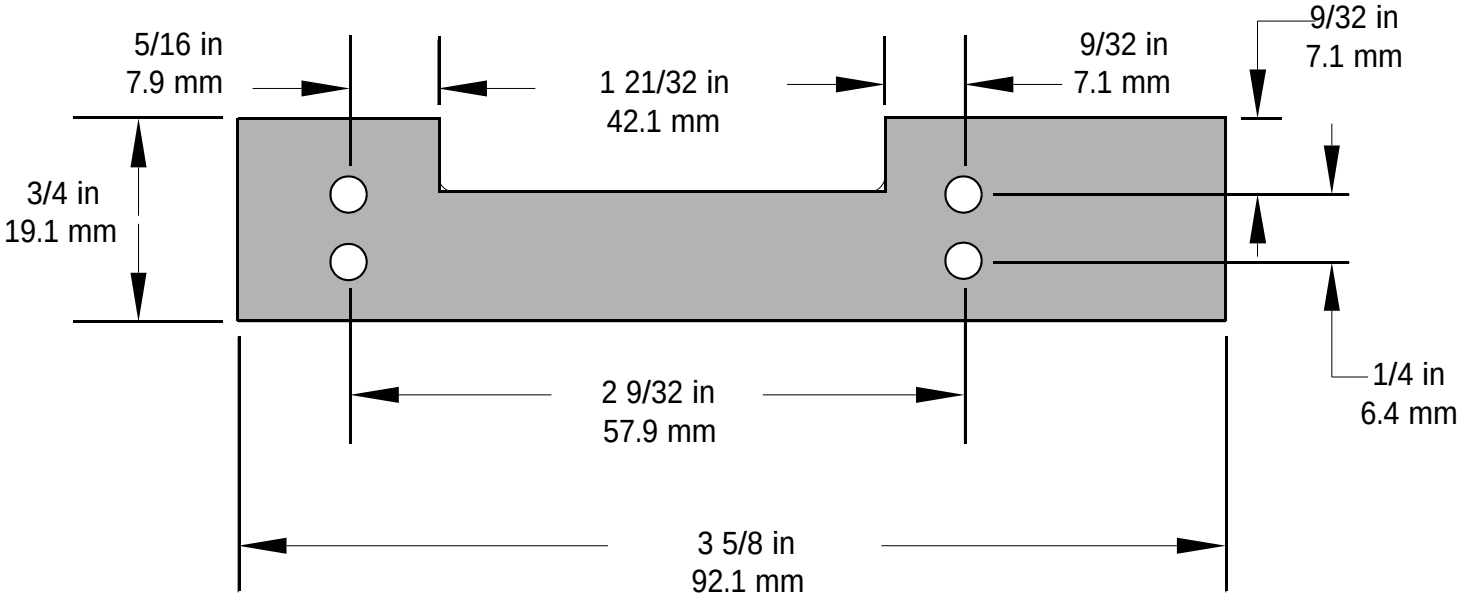


Figure 9-11 Positioning the Transceiver Support Bracket

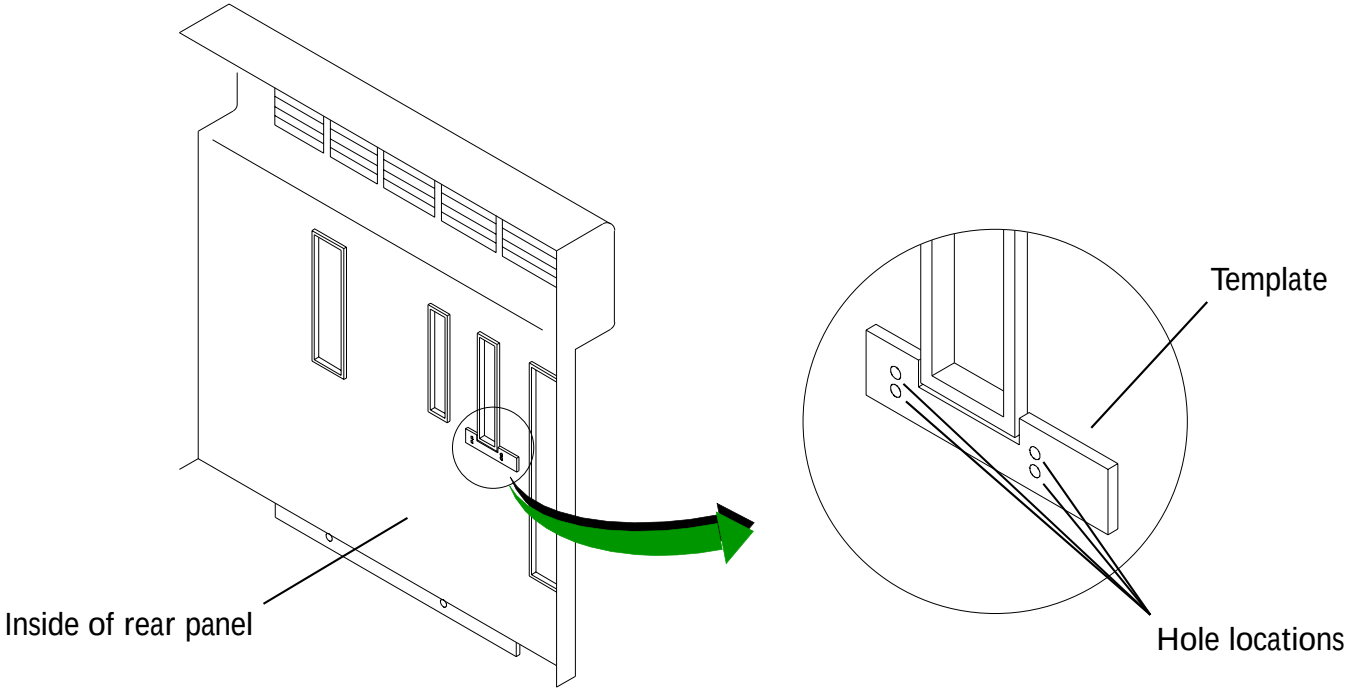
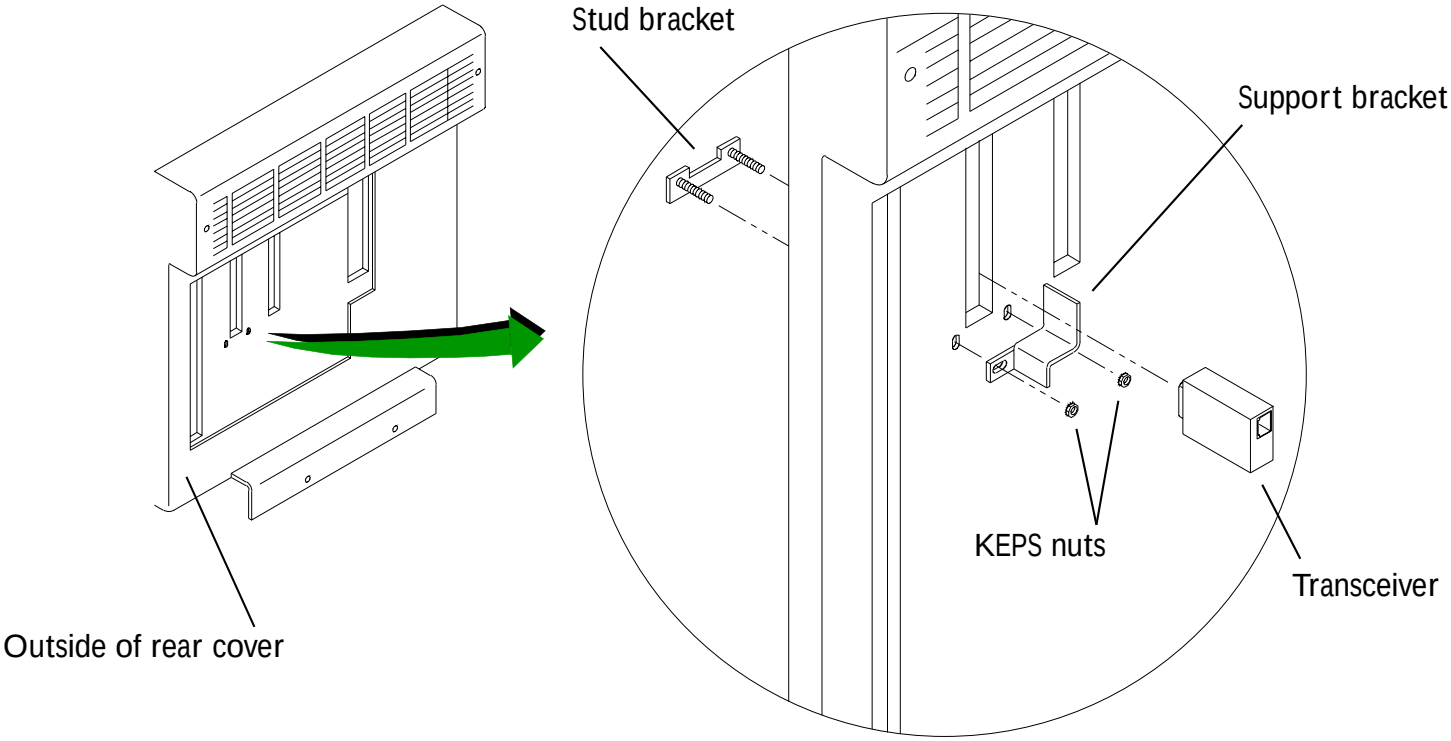


Figure 9-12 Installing the Transceiver Support Bracket



10 Cabling

Introduction

This section contains system cabling and connector information. Use the figures and parts tables Table 10-1 and Table 10-2 in this section to locate and identify system cables and their part numbers. Part numbers are shown on the illustrations and listed and described in the corresponding tables. Figures are keyed to the tables and the tables to the figures, as applicable.

System Connectors and Cabling

Figure 10-1 through Figure 10-5 are illustrations of the system primary connector assemblies. Figure 10-6 shows the numbering pattern of the centerplane and PCB connectors. Figure 10-7 shows the monitor microphone placement and its connector location. Also shown is the general layout of PCBs, the general locations of test points, LEDs, and reset and interrupt switches.

Signal Cables

System and OEM (internal and external) signal cables are illustrated in Figure 10-8 through Figure 10-31. pin-out information for these cables are provided in Table 10-3 through Table 10-25.

Power Cables

System and OEM (internal and external) power cables are illustrated in Figure 10-32 through Figure 10-36. pin-out information for these cables is provided in Table 10-26 through Table 10-29.

Monitor Internal Cabling

Monitor internal cabling is illustrated in Figure 10-37.

NOTE Some of the cables within the video monitor assembly are field-replaceable, and some are not. Cables within the OEM monitor assembly (2100-1346-08 2100-1346-09 2100-1471-01 2100-1589-03 2100-1589-04P/N 2100-1346-XX) are not field-replaceable. If one of the cables in the OEM monitor assembly is bad, order the video monitor assembly (P/N 3500-2532-XX). Refer to Figure 10-37 to determine which cables are included with the OEM monitor assembly.

System Interconnect Cabling

Notes for the classic system interconnect cabling diagrams are provided in Figure 10-38. Classic system signal and power cabling are illustrated in Figure 10-39 and Figure 10-40. Philips HDI 5000 system signal and power cabling are illustrated in Figure 10-41 and Figure 10-42.

Cable Part Numbers

Table 10-1 is a parts list of the interconnect cables. Table 10-2 is a parts list of the power distribution cables. Refer to Table 12-3 for additional information on peripherals and applicable cables.

Table 10-1 HDI 5000 Signal Interconnect Cables

Part Number	Cable Description	Notes/Reference
2275-0327-01	Cable Assy, AAM Input, Internal	Diagram: Figure 10-39
2275-0394-01	Cable Assy, AAM-In, Ext, Level 10	Diagram: Figure 10-39
2275-0395-01	Cable Assy, AAM-Out, Int, Level 10	Diagram: Figure 10-39
2275-0396-01	Cable Assy, AAM-Out, Ext, Level 10	Diagram: Figure 10-39
3500-1540-04	Cable Assy, B&W Page Printer	Diagram: Figure 10-39, Figure 10-41

Table 10-1 HDI 5000 Signal Interconnect Cables (Continued)

Part Number	Cable Description	Notes/Reference
3500-1483-03	Cable Assy, Disk Drive Signal, DDEA	Internal to DDEA
3500-3333-01		Illustration: Figure 12-13, Figure 12-14, Figure 12-16
		Diagram: Figure 10-39, Figure 10-41
3500-1851-01	Cable Assy, Disk Drive, Signal, No MO	See Figure 12-17
4500-5512-01	Cable Assy, External Disk Drive Test	
3500-3334-01		
2275-0326-01	Cable Assy, External OEM	Diagram: Figure 10-39, Figure 10-41
3500-2642-01	Cable Assy, External SVHS VCR	Diagram: Figure 10-39
3500-2644-01	Cable Assy, External RGB Printer	Diagram: Figure 10-39
3500-2771-01	Cable Assy, IIM to P2 UIM	Illustration: Figure 12-39
		Diagram: Figure 10-39, Figure 10-41
3500-2772-01	Cable Assy, ISEM Adapter	Diagram: Figure 10-39
3500-2770-01	Cable Assy, J1 LCP to P1 UIM	Illustration: Figure 12-39
		Diagram: Figure 10-39, Figure 10-41
3500-1835-01	Cable Assy, Jack, Physio, DDEA	Internal to DDEA
		Illustration: Figure 12-13, Figure 12-14

Table 10-1 HDI 5000 Signal Interconnect Cables (Continued)

Part Number	Cable Description	Notes/Reference
2275-0393-01	Cable Assy, LED, 3mm Conn, 8-inch L	Internal to monitor (3500-2532-XX monitor only) Illustration: Figure 12-28 Diagram: Figure 10-37
3500-2632-02 3500-2632-03	Cable Assy, Microphone	-03 is 6-in longer for FIMI monitor Illustration: Figure 12-35 Diagram: Figure 10-39
3500-2752-01	Cable Assy, Microphone, Internal, Mon	Internal to monitor Illustration: Figure 12-28 Diagram: Figure 10-37, Figure 10-39, Figure 10-41
3500-2643-01	Cable Assy, Mitsubishi RGB Printer	Diagram: Figure 10-39
3500-2614-02	Cable Assy, Monitor, Lower Bezel	Internal to monitor Illustration: Figure 12-30, Figure 12-31, Figure 12-62 Diagram: Figure 10-37, Figure 10-39, Figure 10-41
3500-3464-01	Cable Assy, Monitor, Signal	Philips HDI 5000 system Diagram: Figure 10-41

Table 10-1 HDI 5000 Signal Interconnect Cables (Continued)

Part Number	Cable Description	Notes/Reference
3500-2613-01	Cable Assy, Monitor, Upper Bezel	Internal to monitor Illustration: Figure 12-28 Diagram: Figure 10-39
3500-1539-03	Cable Assy, Multi-Image Camera (MIC)	Diagram: Figure 10-39
3500-2639-01	Cable Assy, On/Standby Switch	Illustration: Figure 12-40 Diagram: Figure 10-39, Figure 10-40, Figure 10-41, Figure 10-42
3500-2741-01	Cable Assy, Remote Control Port	Illustration: Figure 12-39, Figure 12-46 Diagram: Figure 10-39, Figure 10-41
3500-2641-02	Cable Assy, Sony RGB Printer	Diagram: Figure 10-39
3500-2633-02	Cable Assy, System Monitor, 64-inch	Diagram: Figure 10-37, Figure 10-39
3500-1404-06	Cable Assy, VCR	Diagram: Figure 10-39
3500-3466-01	Cable Assy, VCR, Signal	Philips HDI 5000 system Diagram: Figure 10-41
2275-0176	Cable, BNC, M/M, GFT, RG 59B/U, 750HM	Diagram: Figure 10-39
2275-0267-01	Cable, RCA-RCA, Stereo, Molded, GFT	Diagram: Figure 10-39

Table 10-1 HDI 5000 Signal Interconnect Cables (Continued)

Part Number	Cable Description	Notes/Reference
3100-2309-01	Connector, DSUB Saver, 15C, W/Slide Latch	(Standoff adapter) For Network Connection Illustration: Figure 10-4 or Figure 12-47
2950-0615-01	Slide Latch, DSUB, Size 2, W/Hardware	For Network Connection Illustration: Figure 10-4 or Figure 12-47
2100-1418-01	Transceiver, 10 Base-T, Module	For Network Connection Illustration: Figure 10-4 or Figure 12-47

Table 10-2 HDI 5000 Power Distribution Cables

Part Number	Cable Description	Notes/Reference
3500-1873-02	Cable Assy, 100-120 VAC, Dual Hardcopy	Diagram: Figure 10-40, Figure 10-42
3500-2397-03	Cable Assy, 230 VAC, Dual Hardcopy	Diagram: Figure 10-40
3500-1482-03	Cable Assy, Disk Drive Power, DDEA	Illustration: Figure 12-12, Figure 12-13, Figure 12-17 Diagram: Figure 10-40, Figure 10-42
3500-1514-03	Cable Assy, Fan, 24 Vdc	Illustration: Figure 12-21 Diagram: Figure 10-40

Table 10-2 HDI 5000 Power Distribution Cables (Continued)

Part Number	Cable Description	Notes/Reference
3500-3427-01	Cable Assy, Fan, Power	Philips HDI 5000 system Illustration: Figure 12-85 Diagram: Figure 10-42
3500-3518-01	Cable Assy, Monitor, Power	Philips HDI 5000 system Diagram: Figure 10-42
3500-1517-04	Cable Assy, Power, 115V, Hardcopy	Diagram: Figure 10-40
3500-1516-05	Cable Assy, Power, 115V, VCR	
3500-2780-01	Cable Assy, Power, 115V, VCR, HDI 5000	Diagram: Figure 10-40
3500-1547-05	Cable Assy, Power, 230V, Hardcopy	Diagram: Figure 10-40
3500-2781-01	Cable Assy, Power, 230V, VCR, HDI 5000	Diagram: Figure 10-40
3500-2616-01	Cable Assy, Power Monitor, Electrohome	Diagram: Figure 10-40
3500-3465-01	Cable Assy, VCR, Power	Philips HDI 5000 system Diagram: Figure 10-42
3500-3467-01	Cable Assy, VCR, Power, 230V	Philips HDI 5000 system Diagram: Figure 10-42
2275-0373-01	Cord, PC Adapter, 10A/125V, 12-inch	
2275-0324-01	Power Cord, Harmonized, CEE-22 & 7 (240V, 10A)	Illustration: Figure 12-22
2275-0391-01	Power Cord, Unshld, Hosp lug, 15'L (120V)	Illustration: Figure 12-22

System Connector Illustrations

Figure 10-1 Connector Locations, Front Panel

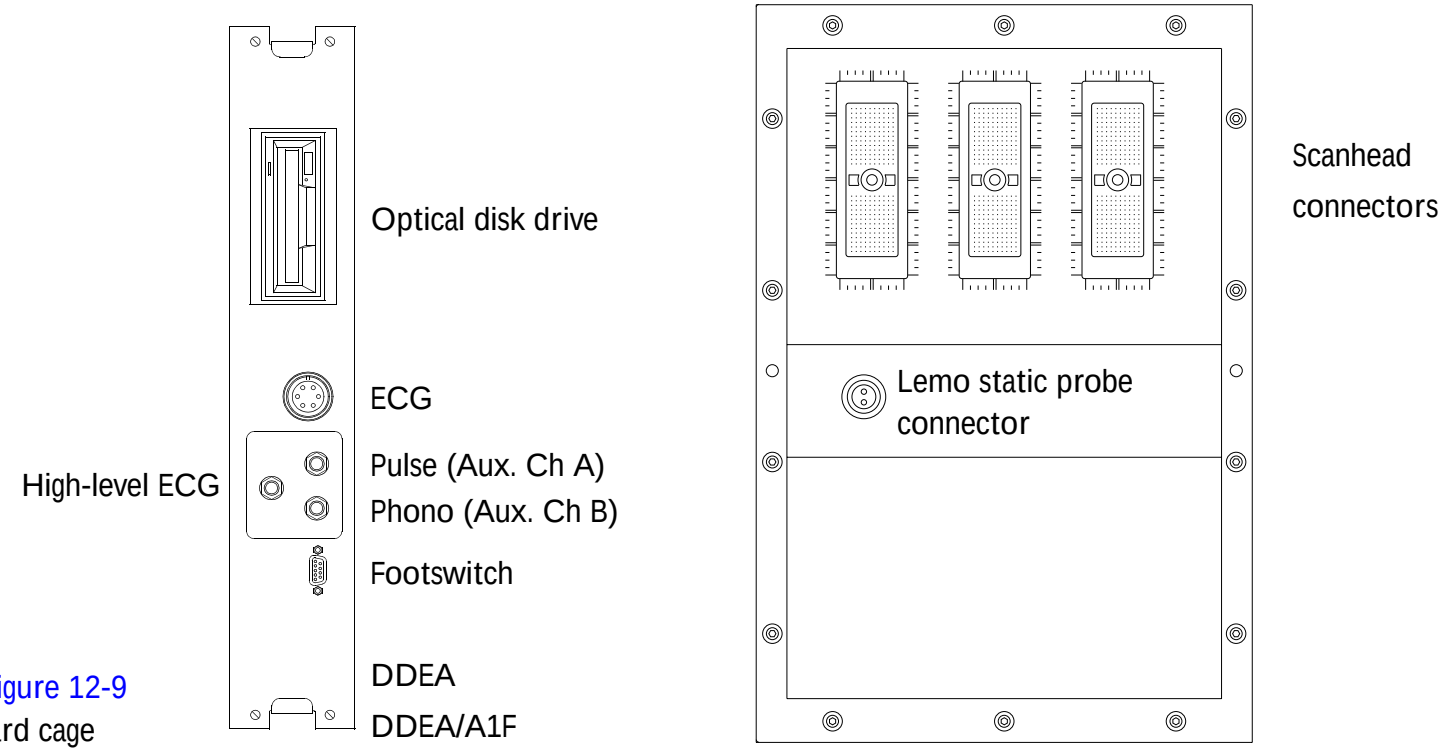


Figure 10-2 Connector Locations, Rear Panel (1 of 2)

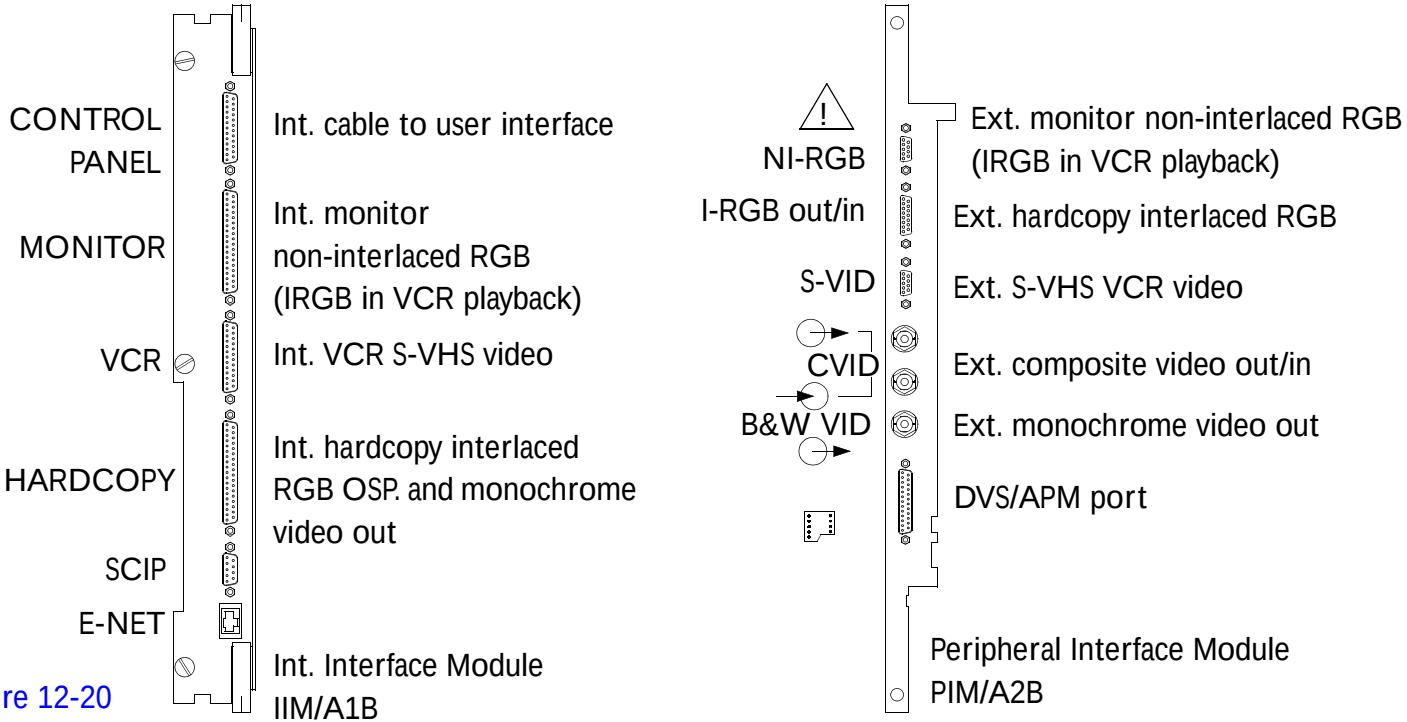


Figure 10-3 Connector Locations, Rear Panel (2 of 2)

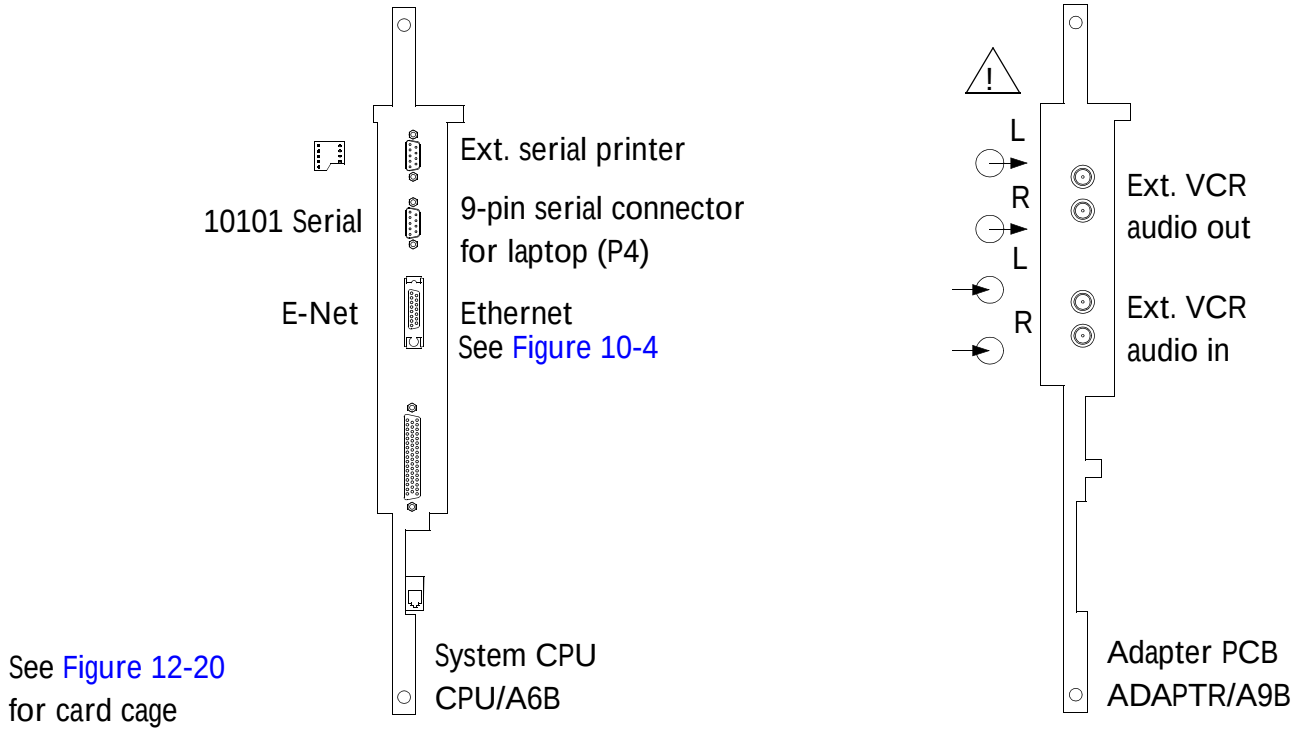
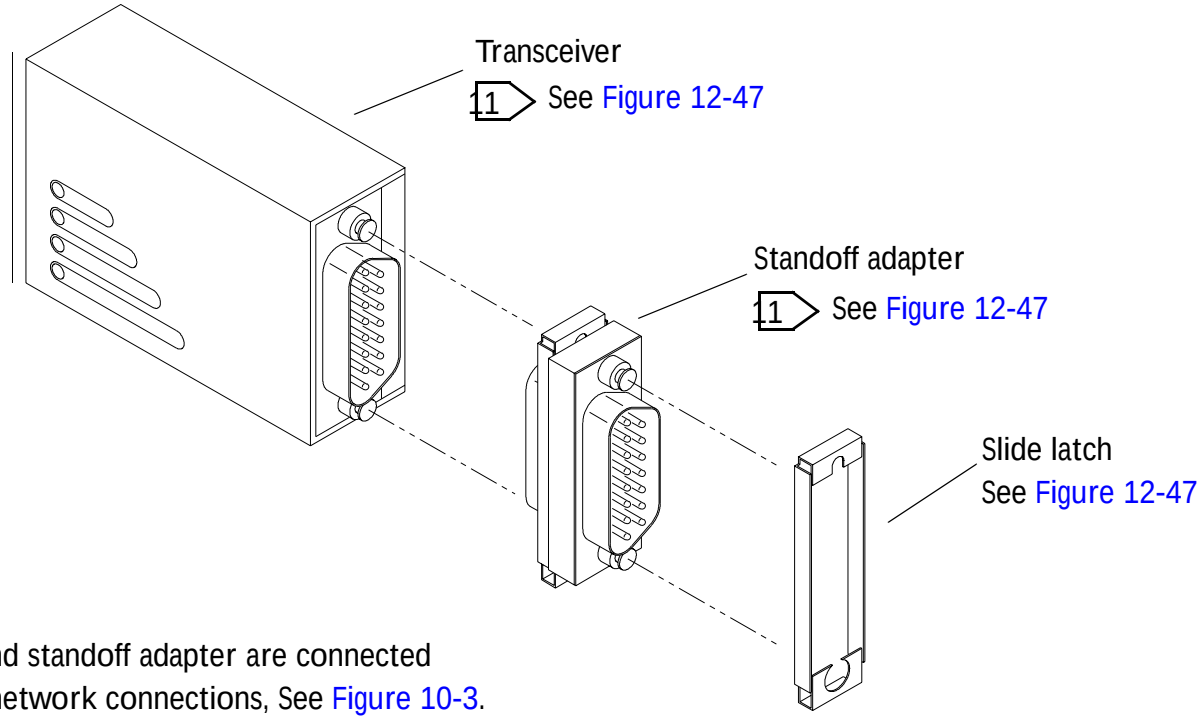


Figure 10-4 Networking Transceiver Detail



1 Transceiver and standoff adapter are connected to E-Net for network connections, See Figure 10-3.

Figure 10-5 AC Input Module (ACIM) Connector Locations

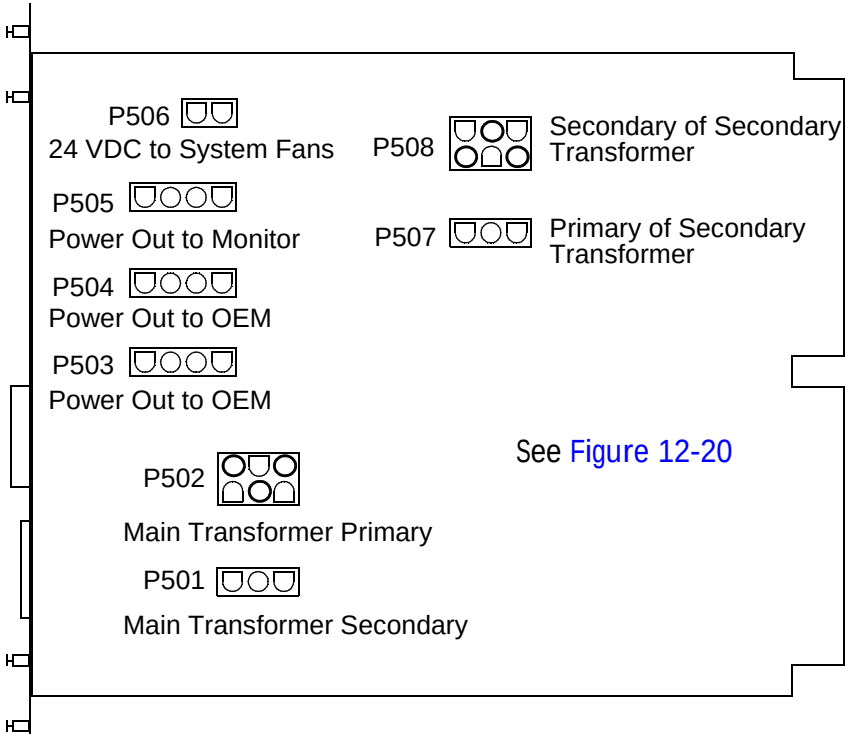


Figure 10-6 Centerplane Connector and Card Edge Features

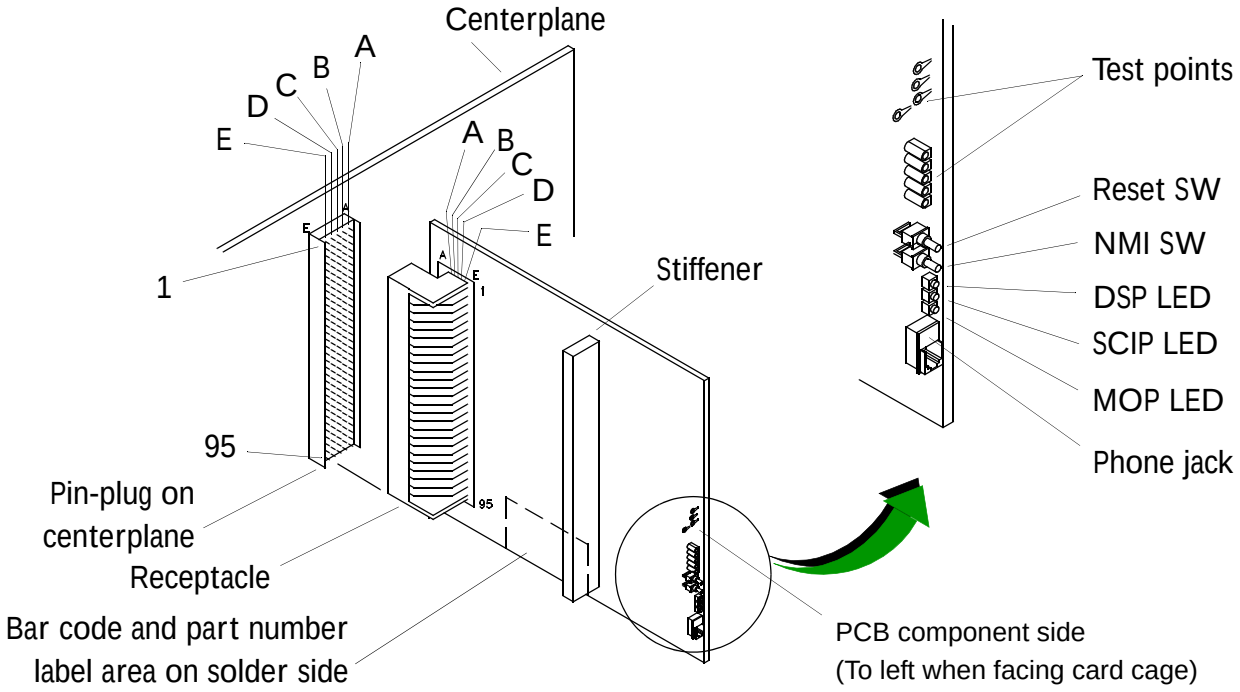
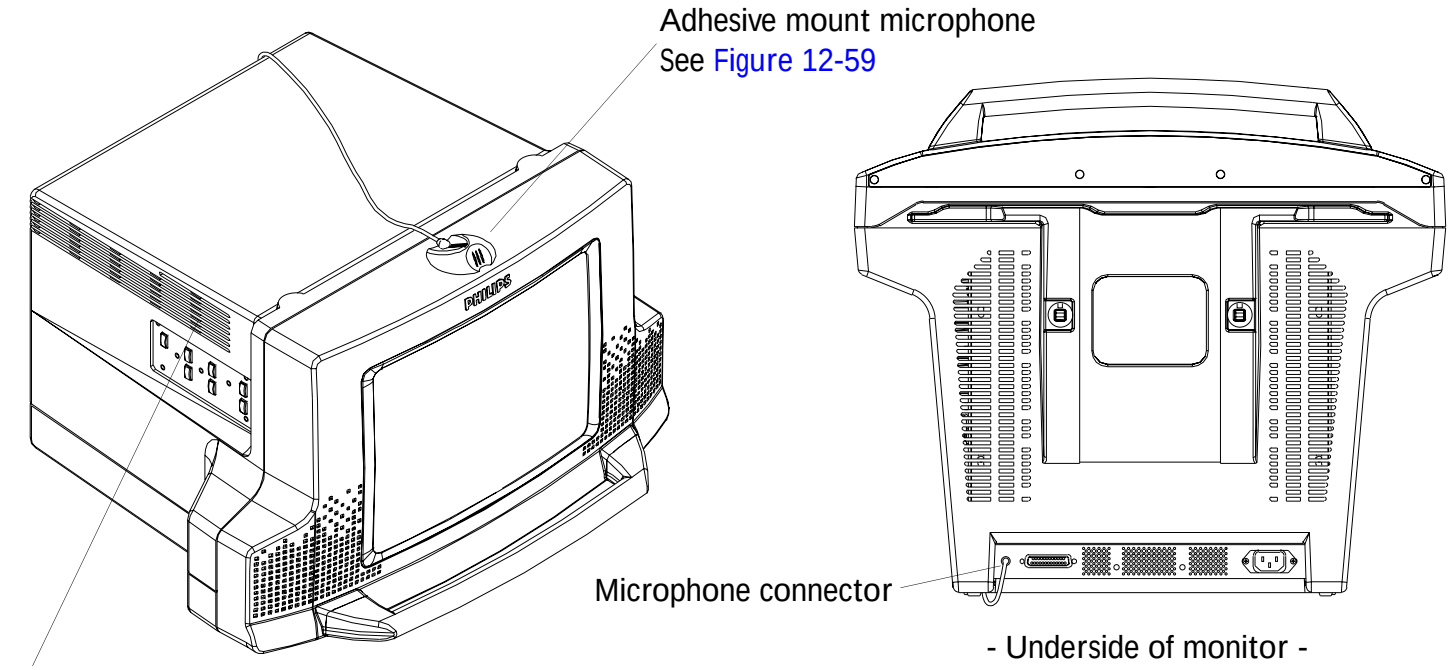
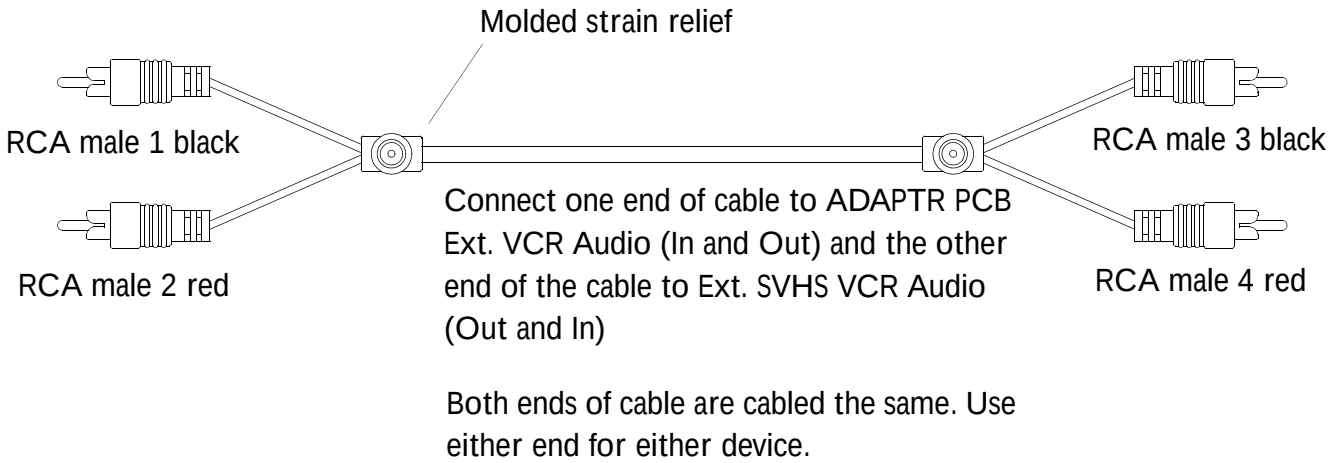


Figure 10-7 Monitor Mount Microphone Connection (Philips Monitor Shown)



System Cable Illustrations and Pin-Out Tables

Figure 10-8 RCA-RCA, Stereo Cable Assembly (P/N 2275-0267-XX)

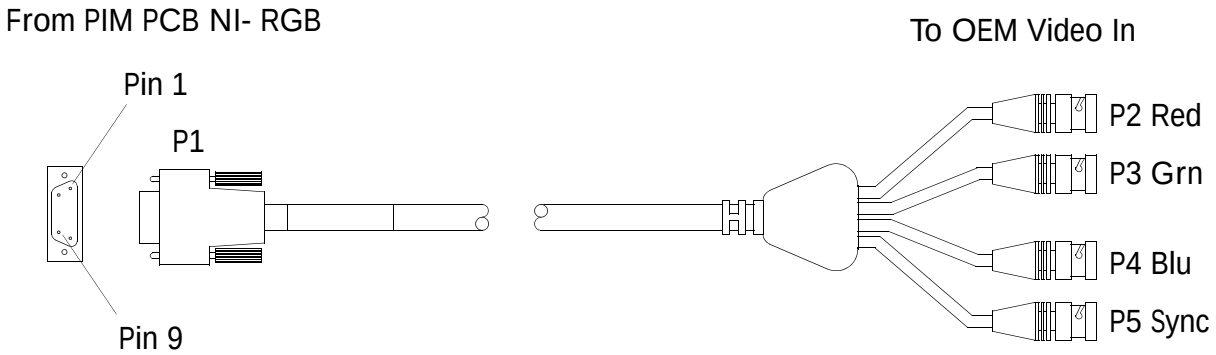

Molded strain relief
RCA male 1 black
RCA male 2 red
RCA male 3 black
RCA male 4 red
Connect one end of cable to ADAPTR PCB Ext. VCR Audio (In and Out) and the other end of the cable to Ext. SVHS VCR Audio (Out and In)
Both ends of cable are cabled the same. Use either end for either device.

Pin-out Table 10-3
Cable Table 10-1

Table 10-3 RCA-RCA, Stereo Cable Assembly (P/N 2275-0267-XX)

From ADAPTR PCB Audio In/Out	To External VCR Audio Out/In	Function
MALE 1 TIP	MALE 3 TIP	R-AUDIO
MALE 1 RING	MALE 3 RING	R-AUDIO GND
MALE 2 TIP	MALE 4 TIP	L-AUDIO
MALE 2 RING	MALE 4 RING	L-AUDIO GND

Figure 10-9 OEM Cable Assembly, External (P/N 2275-0326-XX)

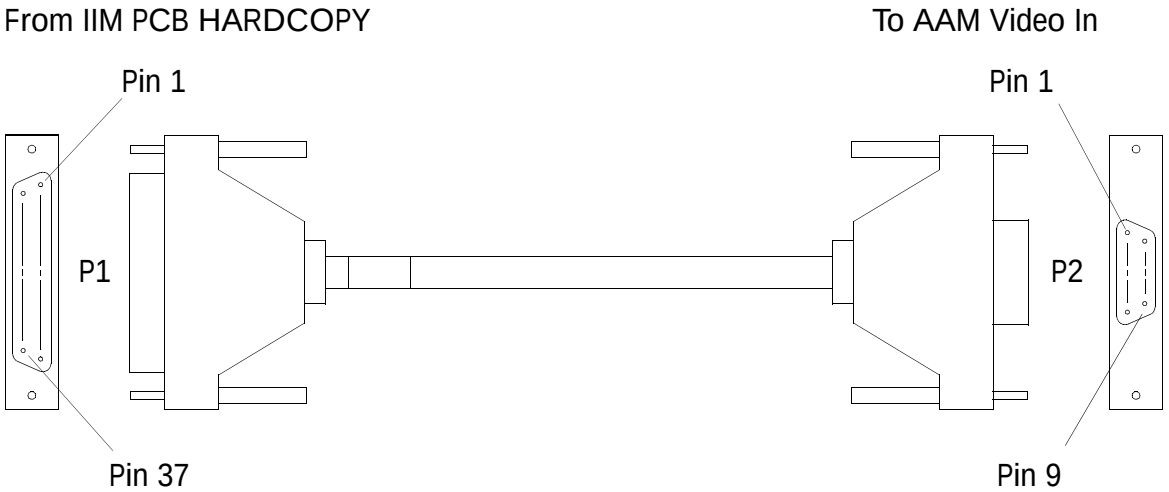


Pin-out Table 10-4
Cable Table 10-1

Table 10-4 OEM Cable Assembly, External (P/N 2275-0326-XX)

From PIM PCB	To OEM Video In Connectors	Function
P1-1	P2 CENTER	RED SIGNAL
P1-6	P2 SHIELD	RED_RETURN
P1-2	P3 CENTER	GREEN SIGNAL
P1-7	P3 SHIELD	GREEN_RETURN
P1-3	P4 CENTER	BLUE SIGNAL
P1-8	P4 SHIELD	BLUE_RETURN
P1-4	P5 CENTER	SYNC SIGNAL
P1-9	P5 SHIELD	SYNC_RETURN

Figure 10-10 AAM Video Input Signal Cable Assembly, Internal (P/N 2275-0327-XX)

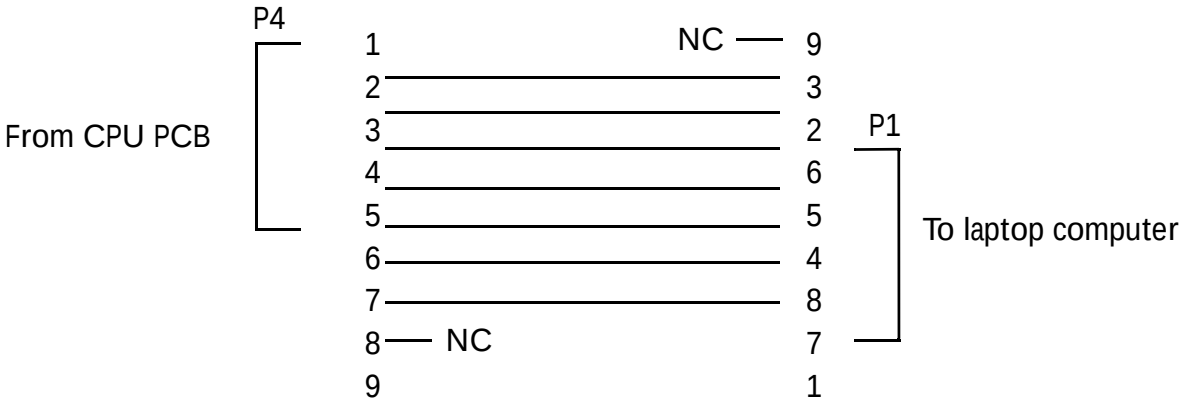


Pin-out Table 10-5
Cable Table 10-1

Table 10-5 AAM Video Input Signal Cable Assembly, Internal (P/N 2275-0327-XX)

From IIM (HARDCOPY)	To AAM (Video In)	Function
P1-1	P2-5	RED SIGNAL
P1-20	P2-4	RED_RETURN
P1-2	P2-3	GREEN SIGNAL
P1-21	P2-4	GREEN_RETURN
P1-3	P2-1	BLUE SIGNAL
P1-22	P2-2	BLUE_RETURN
P1-4	P2-6	SYNC SIGNAL
P1-23	P2-2	SYNC_RETURN

Figure 10-11 Serial Data Cable Assembly (P/N 2275-0337-XX)



P4 is the second connector from the top of the CPU PCB (9 pin Dsub, male).

Either end of the cable may be used on the HDI 5000 or the laptop connectors.

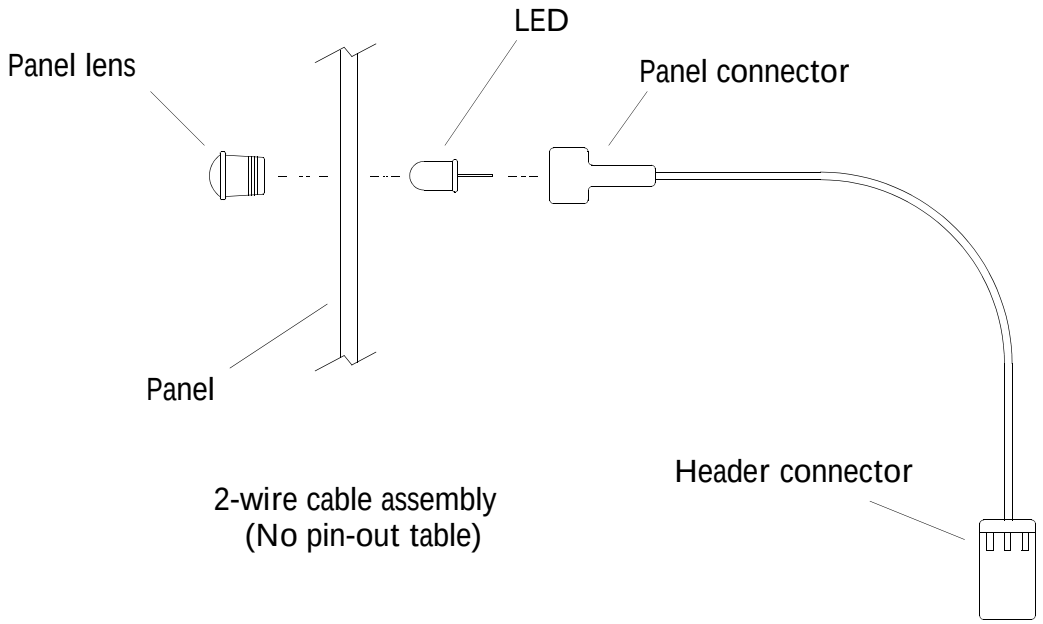
The only wires needed for communication between the HDI 5000 and a laptop computer are the TX, RX, and GND wires.

Pin-out Table 10-6
Cable Table 10-1

Table 10-6 Serial Data Cable Assembly (P/N 2275-0337-XX)

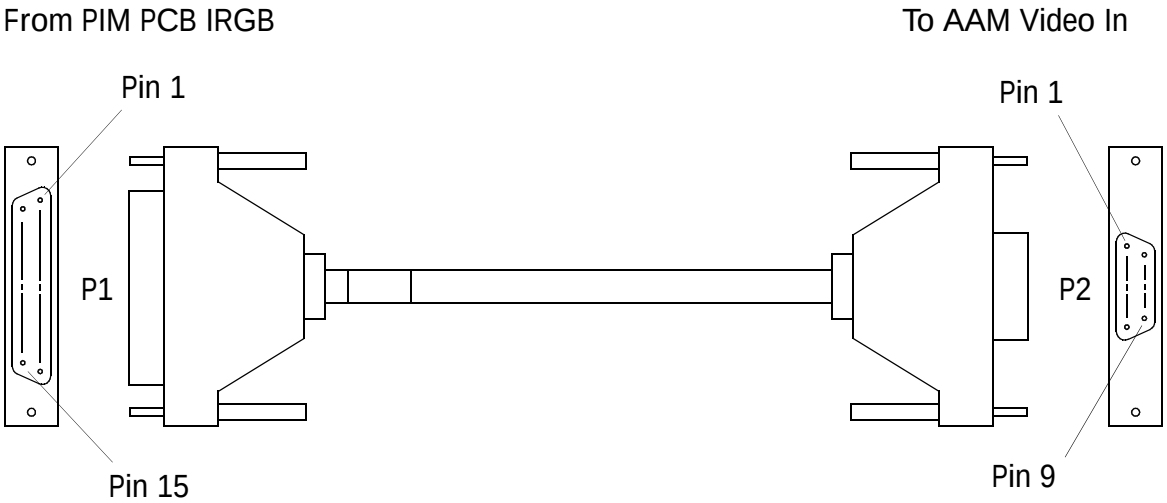
From CPU	To Laptop	Signal Function (P4 on CPU)
P4-1 to P4-6	-	CD
P4-2	P1-3	RX
P4-3	P1-2	TX
P4-4	P1-6 to P1-1	DTR
P4-5	P1-5	GND
P4-6	P1-4	DSRn
P4-7	P1-8	RTS
P4-8	P1-7	CTS
P4-9	-	NO CONNECTION
-	P1-9	

Figure 10-12 LED Cable Assembly (P/N 2275-0393-XX)



Cable assembly is located in the monitor. The LED is positioned above the monitor controls and may be seen through holes in the monitor cover.

Figure 10-13 AAM Input Cable Assembly, External (P/N 2275-0394-XX)

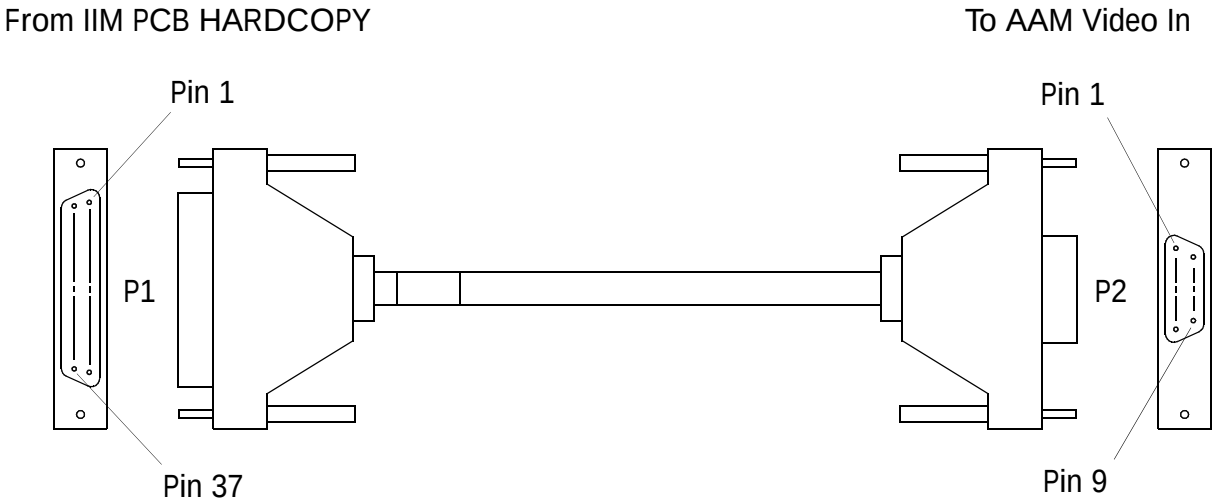


Pin-out Table 10-7
Cable Table 10-1

Table 10-7 AAM Input Cable Assembly, External (P/N 2275-0394-XX)

From PIM (IRGB)	To AAM (Video In)	Function
P1-1	P2-5	RED SIGNAL
P1-9	P2-4	RED RETURN
P1-2	P2-3	GREEN SIGNAL
P1-10	P2-4	GREEN RETURN
P1-3	P2-1	BLUE SIGNAL
P1-11	P2-2	BLUE RETURN
P1-4	P2-6	SYNC SIGNAL
P1-12	P2-2	SYNC RETURN

Figure 10-14 AAM Output Cable Assembly, Internal (P/N 2275-0395-XX)

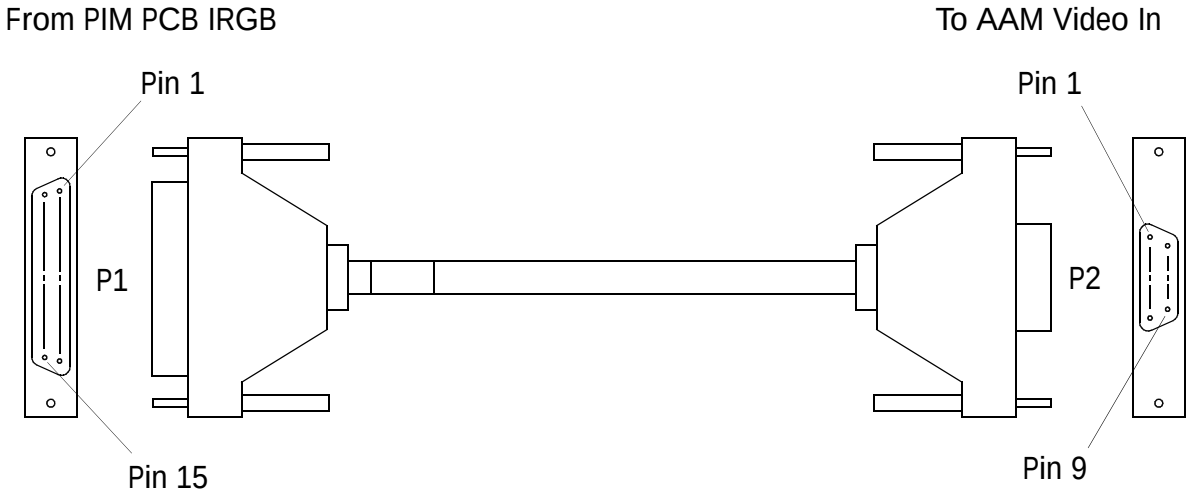


Pin-out Table 10-8
Cable Table 10-1

Table 10-8 AAM Output Cable Assembly, Internal (P/N 2275-0395-XX)

From IIM (HARDCOPY)	To AAM (Video In)	Function
P1-9	P2-3	Y-SIGNAL
P1-10	P2-8	Y-RETURN
P1-15	P2-4	C-SIGNAL
P1-5	P2-9	C-RETURN

Figure 10-15 AAM Output Cable Assembly, External (P/N 2275-0396-XX)

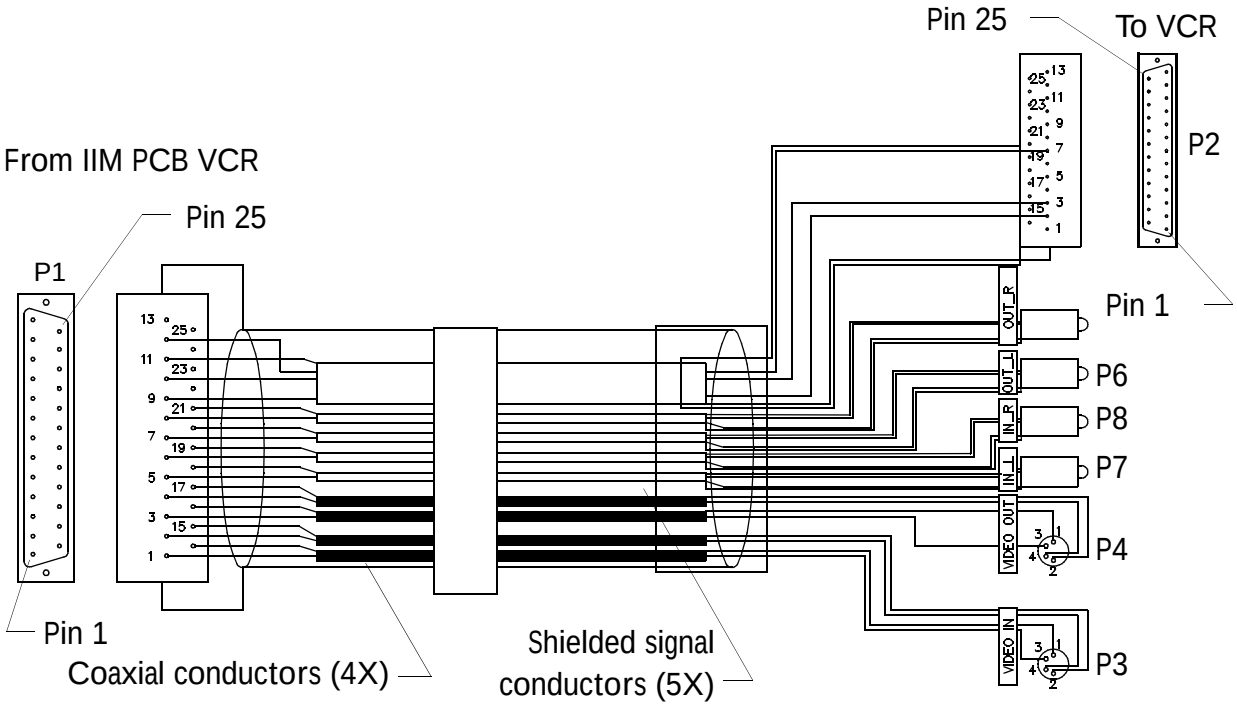


Pin-out Table 10-9
Cable Table 10-1

Table 10-9 AAM Output Cable Assembly, External (P/N 2275-0396-XX)

From PIM (IRGB)	To AAM (Video In)	Function
P1-9	P2-3	Y-SIGNAL
P1-10	P2-8	Y-RETURN
P1-15	P2-4	C-SIGNAL
P1-5	P2-9	C-RETURN

Figure 10-16 VCR Signal Cable Assembly, Internal (P/N 3500-1404-XX)

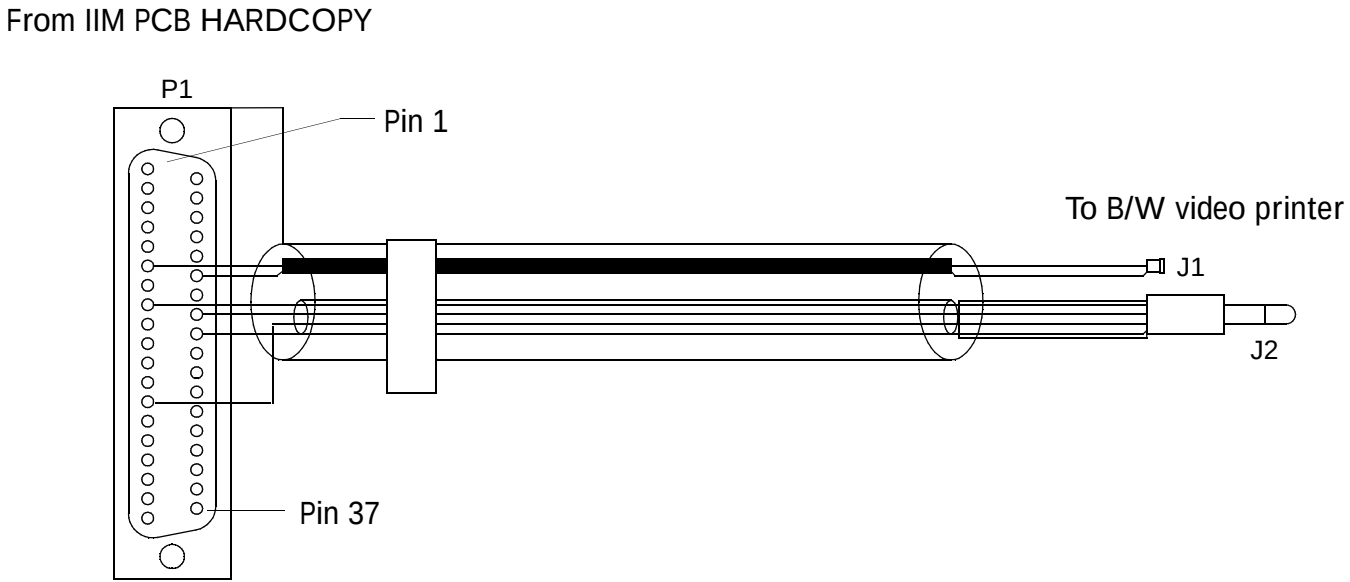


Pin-out Table 10-10
Cable Table 10-1

Table 10-10 VCR Signal Cable Assembly, Internal (P/N 3500-1404-XX)

From IIM (VCR)	To VCR	Function
P1-1	P3-3	VCR_IN_Y
P1-14	P3-1 (Shield)	VCR_IN_Y return
P1-2	P3-4	VCR_IN_C
P1-15	P3-2 (Shield)	VCR_IN_C return
P1-9	P2-2	TX
P1-10	P2-3	RX
P1-12	P2-7	Return
P1-11	P2-Shell	Shield
P1-3	P4-3	VCR_OUT_Y
P1-16	P4-1 (Shield)	VCR_OUT_Y return
P1-4	P4-4	VCR_OUT_C
P1-17	P4-2 (Shield)	VCR_OUT_C return
P1-5	P7-Center	IN_L
P1-18	P7-Shield	IN_L_RET
P1-6	P8-Center	IN_R
P1-19	P8-Shield	IN_R_RET
P1-7	P6-Center	OUT_L
P1-20	P6-Shield	OUT_L_RET
P1-8	P5-Center	OUT_R
P1-21	P5-Shield	OUT_R_RET

Figure 10-17 B/W Video Printer Signal Cable Assembly, Internal (P/N 3500-1540-XX)

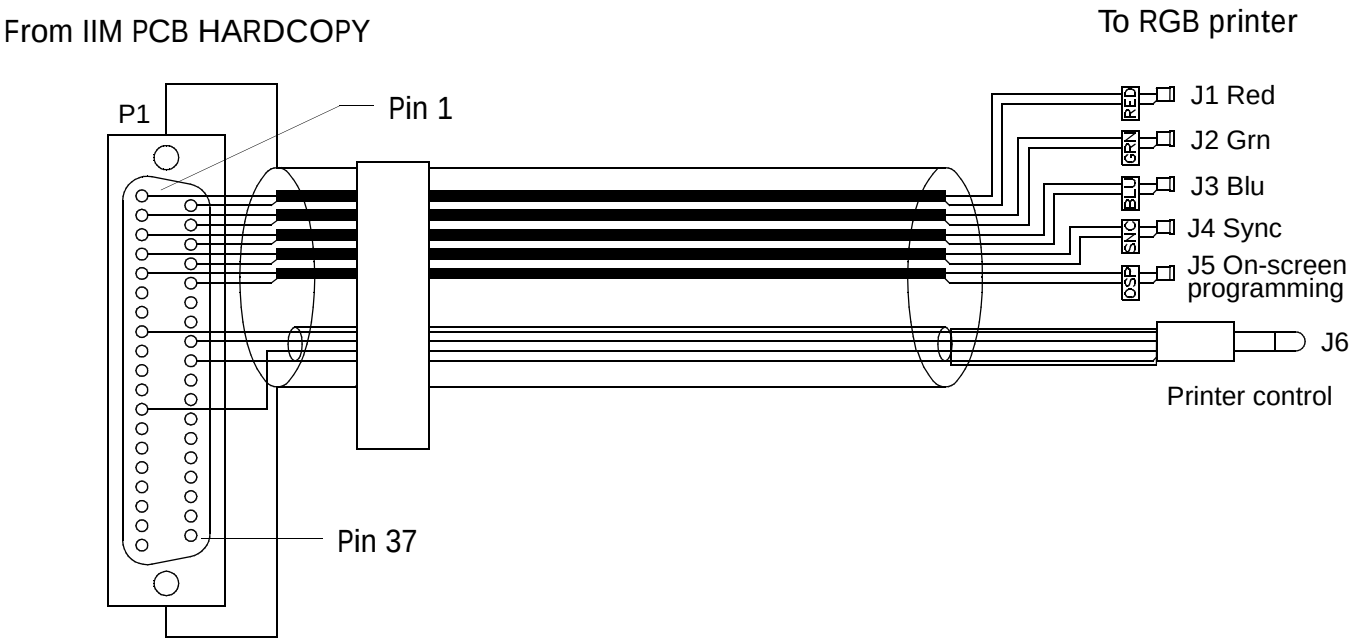


Pin-out Table 10-11
Cable Table 10-1

Table 10-11 B/W Video Printer Signal Cable Assembly, Internal (P/N 3500-1540-XX)

From IIM (HARDCOPY)	To B/W Video Printer	Function
P1-6	J1 Center	VIDEO
P1-25	J1 Shield	VIDEO_RETURN
P1-8	J2 Tip	PRINT
P1-13	J2 Ring	READY
P1-27	J2 Housing	RETURN
P1-28	J2 Shell	(Drain wire)

Figure 10-18 RGB Printer Signal Cable Assembly, Internal (P/N 3500-1541-XX)

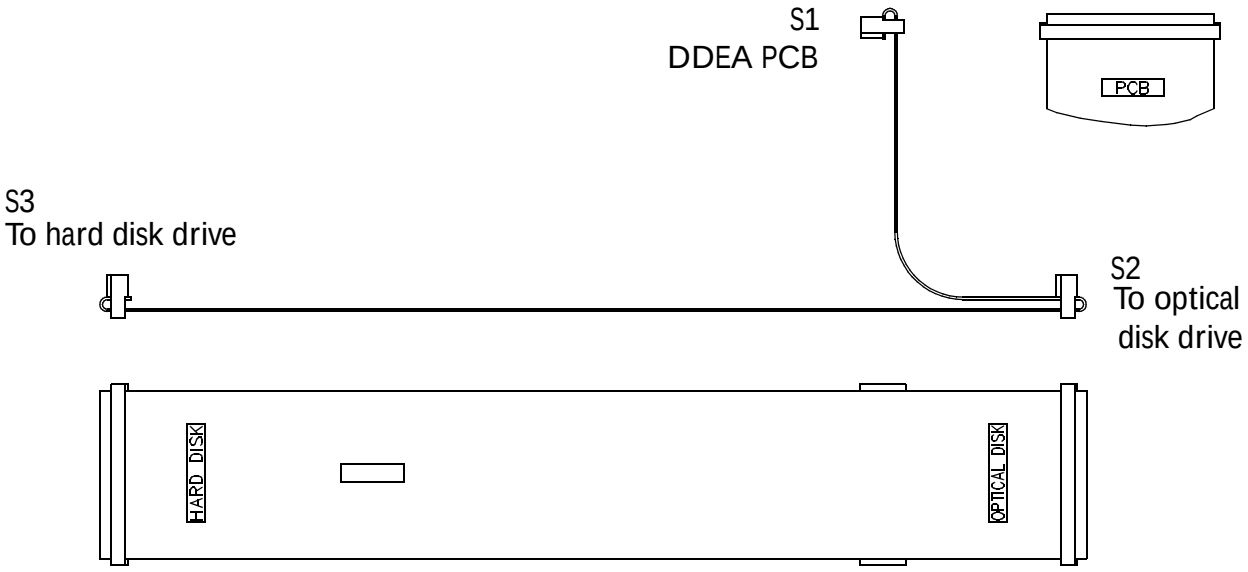


Pin-out Table 10-12
Cable Table 10-1

Table 10-12 RGB Printer Signal Cable Assembly, Internal (P/N 3500-1541-XX)

From IIM (HARDCOPY)	To RGB Printer	Function
P1-1	J1 Center	RED (R)
P1-20	J1 Shield	RED_RETURN
P1-2	J2 Center	GRN (G)
P1-21	J2 Shield	GRN_RETURN
P1-3	J3 Center	BLU (B)
P1-22	J3 Shield	BLUE_RETURN
P1-4	J4 Center	SNC (Sync)
P1-23	J4 Shield	SNC_RETURN
P1-5	J5 Center	OSP (VIDEO OUT)
P1-24	J5 Shield	OSP_RETURN (VIDEO OUT RETURN)
P1-8	J6 Tip	-
P1-12	J6 Ring	-
P1-27	J6 Housing	-
P1-28	Shield (Drain)	(Shield connected to housing at J6)

Figure 10-19 Disk Drive Signal Cable Assy (P/N 3500-1483-XX)



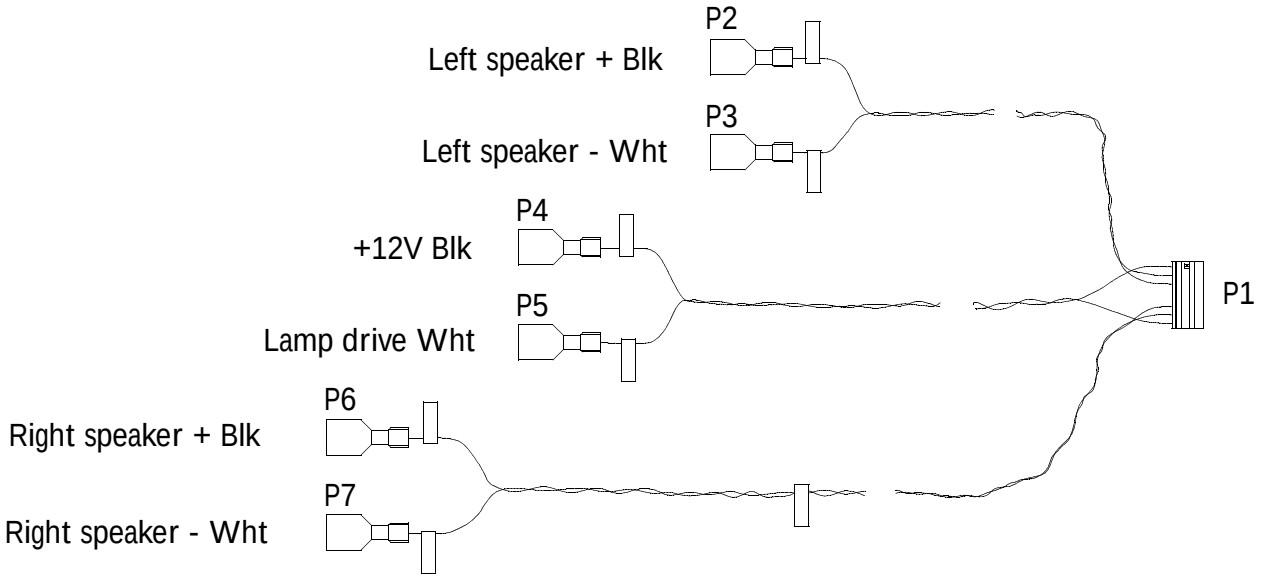
All wires have corresponding pins on both connectors.

Pin-out Table 10-13
Cable Table 10-1

Table 10-13 Disk Drive Signal Cable Assembly (P/N 3500-1483-XX)

From DDEA	To Optical Drive	To Hard Drive
S1-1	S2-1	S3-1
S1-2	S2-2	S3-2
S1-3	S2-3	S3-3
S1-X	S2-X	S3-X
S1-49	S2-49	S3-49
S1-50	S2-50	S3-50

Figure 10-20 Monitor Lower Bezel Cable Assembly (P/N 3500-2614-XX)

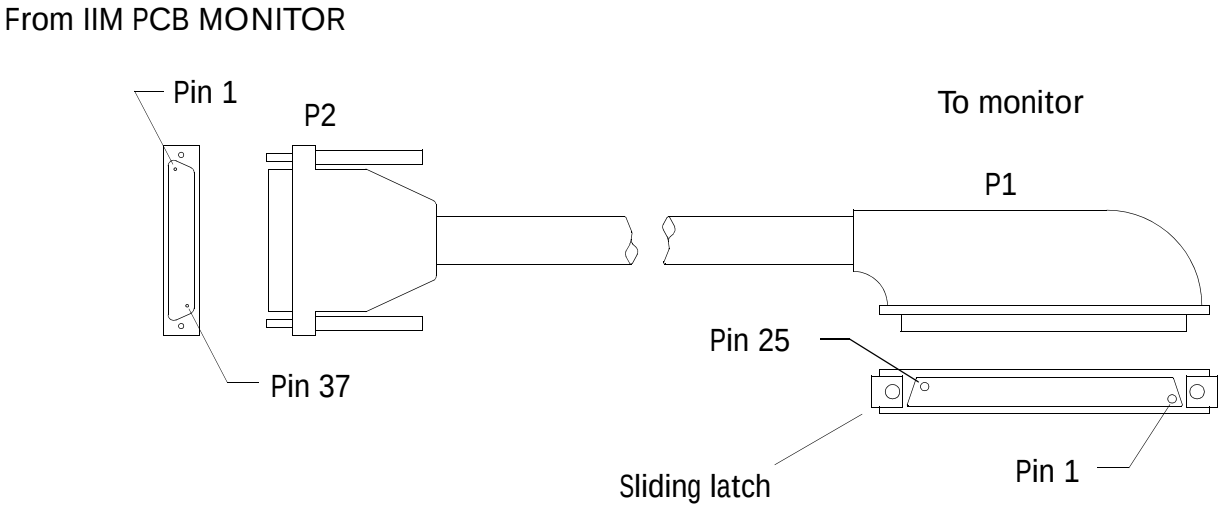


Pin-out Table 10-14
Cable Table 10-1

Table 10-14 Monitor Lower Bezel Cable Assembly (P/N 3500-2614-XX)

P1	P2	P3	P4	P5	P6	P7	Function
1	-	-	1	-	-	-	+12V (black)
2	1	-	-	-	-	-	Left Speaker+ (black)
3	-	1	-	-	-	-	Left Speaker- (white)
4	-	-	-	-	-	-	Ground (not used)
5	-	-	-	-	1	-	Right Speaker+ (black)
6	-	-	-	-	-	1	Right Speaker- (white)
7	-	-	-	1	-	-	Lamp Drive (white)

Figure 10-21 Monitor Signal Cable Assembly (P/N 3500-2633-XX)

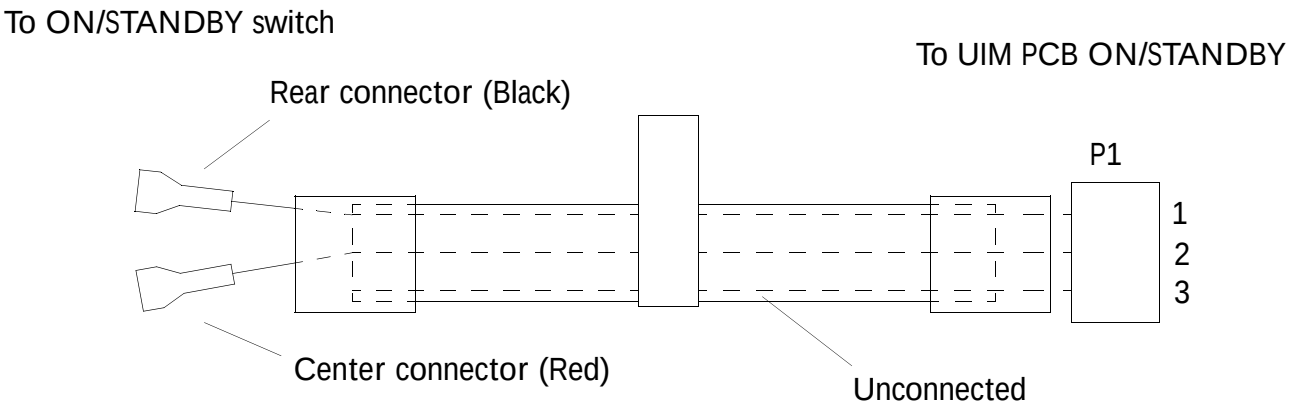


Pin-out Table 10-15
Cable Table 10-1

Table 10-15 Monitor Signal Cable Assembly (P/N 3500-2633-XX)

From IIM (MONITOR)	To Monitor	Function
P2-1	P1-10	GND
P2-20	P1-9	L_SPKR
P2-2	P1-22	GND
P2-21	P1-21	R_SPKR
P2-14	-	AUDIO SHIELD
P2-11	P1-11	MICR+
P2-30	P1-13	MICR-
P2-12	P1-12	MICR_SHIELD
P2-33	P1-17	CSYNC_INTMON
P2-15	P1-4	GND
P2-17	P1-16	BLUE_INTMON
P2-35	P1-3	BLUE_INTMON_REF
P2-18	P1-15	GREEN_INTMON
P2-36	P1-2	GREEN_INTMON_REF
P2-19	P1-14	RED_INTMON
P2-37	P1-1	RED_INTMON_REF

Figure 10-22 On/Standby Switch Cable Assembly (P/N 3500-2639-XX)

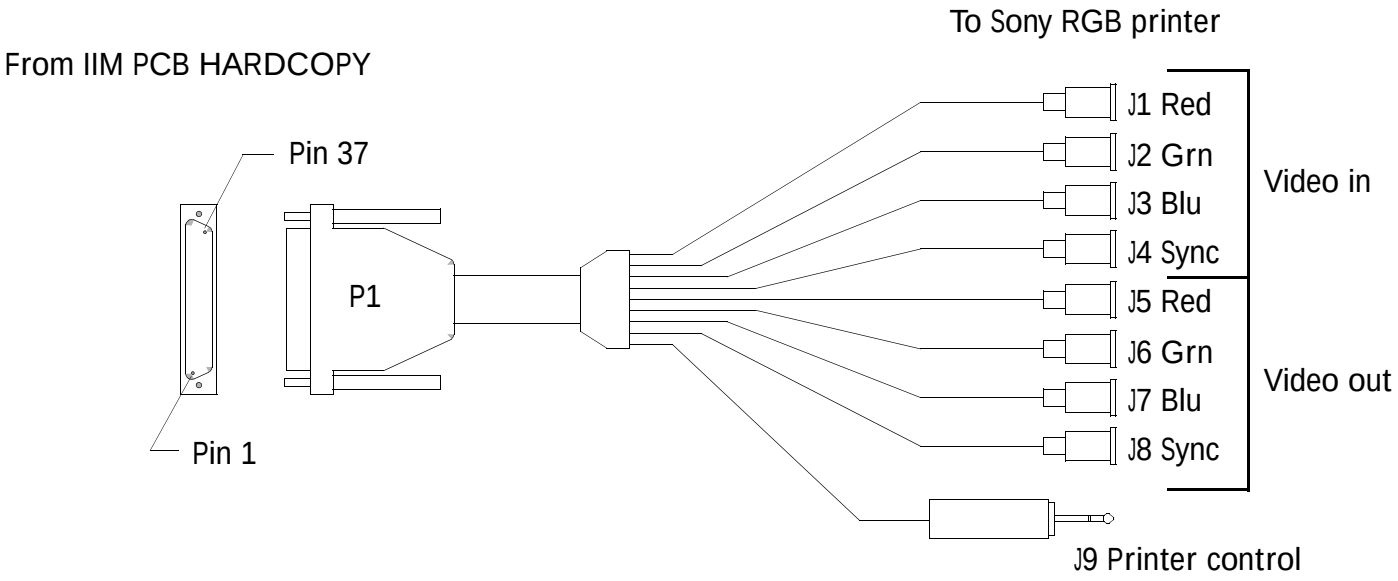


Pin-out Table 10-16
Cable Table 10-1

Table 10-16 On/Standby Switch Cable Assembly (P/N 3500-2639-XX)

From UIM PCB	To ON/STANDBY Switch Spade Lugs	Function
P1-1	Spade Lug (Black wire)	GROUND
P1-2	Spade Lug (Red wire)	IIM_P2-8
P1-3	Drain - No Connection (Gnd)	GROUND

Figure 10-23 Sony RGB Printer Cable Assembly (P/N 3500-2641-XX)

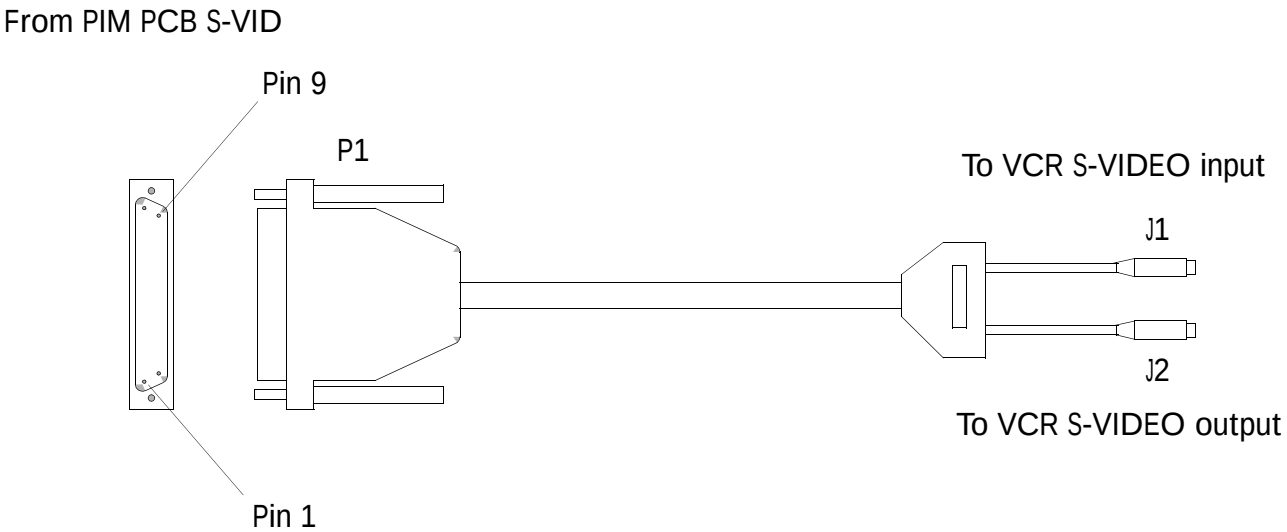


Pin-out Table 10-17
Cable Table 10-1

Table 10-17 Sony RGB Printer Cable Assembly (P/N 3500-2641-XX)

From IIM HARDCOPY	To Coax Connectors	Function
P1-1	J1 Center	PIM_RED_INTHRDCPY
P1-20	J1 Shield	RED_OUT_RETURN
P1-2	J2 Center	PIM_GRN_INTHRDCPY
P1-21	J2 Shield	GRN_OUT_RETURN
P1-3	J3 Center	PIM_BLUE_INTHRDCPY
P1-22	J3 Shield	BLUE_OUT_RETURN
P1-4	J4 Center	PIM_CSYNC_INTHRDCPY
P1-23	J4 Shield	CSYNC_OUT_RETURN
P1-14	J5 Center	INTHRDCPY_RED_PIM
P1-25	J5 Shield	RED_IN_RETURN
P1-15	J6 Center	INTHRDCPY_GRN_PIM
P1-26	J6 Shield	GRN_IN_RETURN
P1-16	J7 Center	INTHRDCPY_BLUE_PIM
P1-27	J7 Shield	BLUE_OUT_RETURN
P1-17	J8 Center	INTHRDCPY_CSYNC_PIM
P1-28	J8 Shield	CSYNC_IN_RETURN
P1-8	J9 Tip	PIM_CNTRL_0_INTHRDCPY
P1-12	J9 Ring	INTHRDCPY_STATUS_0_PIM
P1-29	J9 Housing	GROUND
P1-30	J9 Housing	SHIELD

Figure 10-24 SVHS VCR Cable Assembly, External (P/N 3500-2642-XX)

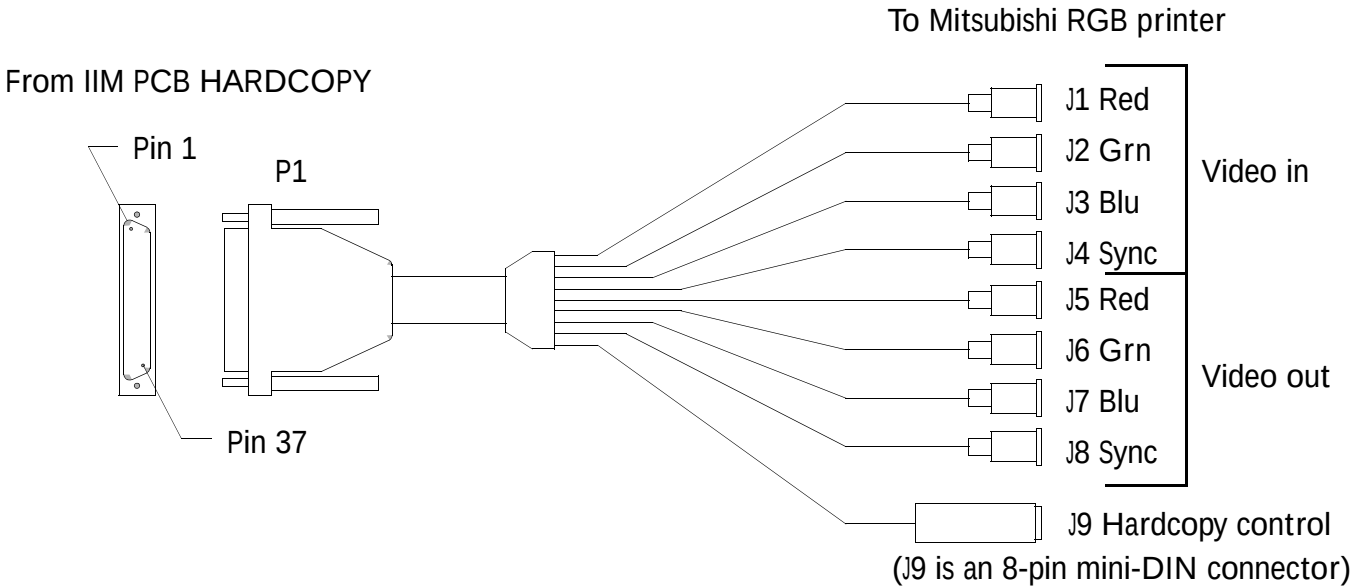


Pin-out Table 10-18
Cable Table 10-1

Table 10-18 SVHS VCR Cable Assembly, External (P/N 3500-2642-XX)

From PIM SVID	To J1/J2	Function
P1-1	J1-3	PIM_LUMA_EXTVCR
P1-5	J1-1	PIM_LUMA_EXTVCR_RETURN
P1-2	J1-4	PIM_CHROMA_EXTVCR
P1-6	J1-2	PIM_CHROMA_EXTVCR_RETURN
P1-3	J2-3	EXTVCR_LUMA_PIM
P1-7	J2-1	EXTVCR_LUMA_PIM_RETURN
P1-4	J2-4	EXTVCR_CHROMA_PIM
P1-8	J2-2	EXTVCR_CHROMA_PIM_RETURN

Figure 10-25 Mitsubishi RGB Printer Cable Assembly (P/N 3500-2643-XX)

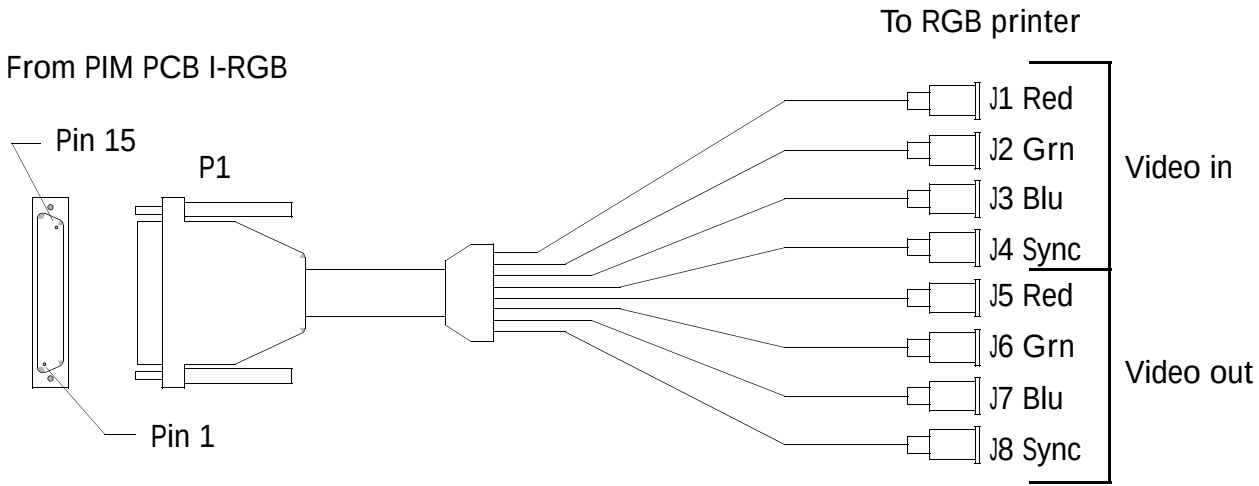


Pin-out Table 10-19
Cable Table 10-1

Table 10-19 Mitsubishi RGB Printer Cable Assembly (P/N 3500-2643-XX)

From IIM HARDCOPY	To Coax Connectors	Function
P1-1	J1 Center	PIM_RED_INTHRDCPY
P1-20	J1 Shield	RED_OUT_RETURN
P1-2	J2 Center	PIM_GRN_INTHRDCPY
P1-21	J2 Shield	GRN_OUT_RETURN
P1-3	J3 Center	PIM_BLUE_INTHRDCPY
P1-22	J3 Shield	BLUE_OUT_RETURN
P1-4	J4 Center	PIM_CSYNC_INTHRDCPY
P1-23	J4 Shield	CSYNC_OUT_RETURN
P1-14	J5 Center	INTHRDCPY_RED_PIM
P1-25	J5 Shield	RED_IN_RETURN
P1-15	J6 Center	INTHRDCPY_GRN_PIM
P1-26	J6 Shield	GRN_IN_RETURN
P1-16	J7 Center	INTHRDCPY_BLUE_PIM
P1-27	J7 Shield	BLUE_OUT_RETURN
P1-17	J8 Center	INTHRDCPY_CSYNC_PIM
P1-28	J8 Shield	CSYNC_IN_RETURN
P1-8	J9-5	PIM_CNTRL0_HRDCPY
P1-9	J9-2	PIM_CNTRL1_HRDCPY
P1-12	J9-4	HRDCPY_STATUS0_PIM
P1-29	J9 Shield	SHIELD

Figure 10-26 RGB Printer Cable Assembly, External (P/N 3500-2644-XX)

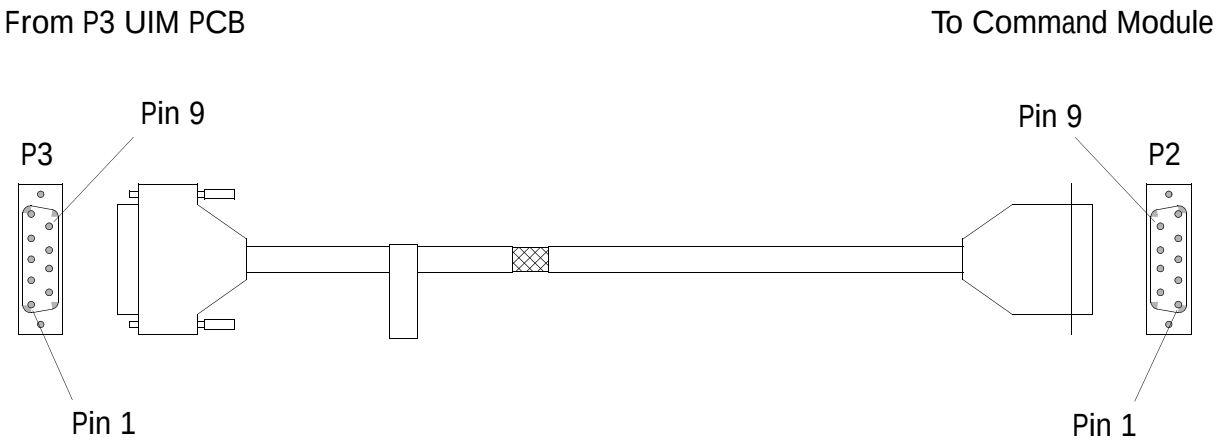


Pin-out Table 10-20
Cable Table 10-1

Table 10-20 RGB Printer Cable Assembly, External (P/N 3500-2644-XX)

From PIM IRGB	To Coax Connectors	Function
P1-1	J1 Center	PIM_RED_EXTHRDCPY
P1-9	J1 Shield	RED_OUT_RETURN
P1-2	J2 Center	PIM_GRN_EXTHRDCPY
P1-10	J2 Shield	GRN_OUT_RETURN
P1-3	J3 Center	PIM_BLUE_EXTHRDCPY
P1-11	J3 Shield	BLUE_OUT_RETURN
P1-4	J4 Center	PIM_CSYNC_EXTHRDCPY
P1-12	J4 Shield	CSYNC_OUT_RETURN
P1-8	J5 Center	EXTHRDCPY_RED_PIM
P1-13	J5 Shield	RED_IN_RETURN
P1-7	J6 Center	EXTHRDCPY_GRN_PIM
P1-14	J6 Shield	GRN_IN_RETURN
P1-6	J7 Center	EXTHRDCPY_BLUE_PIM
P1-15	J7 Shield	BLUE_OUT_RETURN
P1-5	J8 Center	EXTHRDCPY_CSYNC_PIM
P1-15	J8 Shield	CSYNC_IN_RETURN

Figure 10-27 Remote Control Port Cable Assembly (P/N 3500-2741-XX)

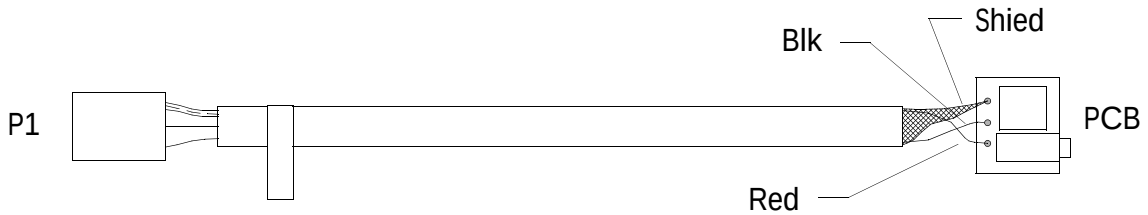


Pin-out Table 10-21
Cable Table 10-1

Table 10-21 Remote Control Port Cable Assembly (P/N 3500-2741-XX)

From P3 UIM	To P2 Command Module	Function
P3-9	P2-9	+5 VOLT
P3-8	P2-8	+5 VOLT
P3-7	P2-7	GROUND
P3-6	P2-6	GROUND
P3-5	P2-5	GROUND (Not used)
P3-4	P2-4	RMOTE_DATA_UIF
P3-3	P2-3	PIM_CLOCK_UIF
P3-2	P2-2	PIM_STROBE_UIF
P3-1	P2-1	UIF_DATA_RMOTE

Figure 10-28 Microphone Internal Monitor Cable Assembly (P/N 3500-2752-XX)

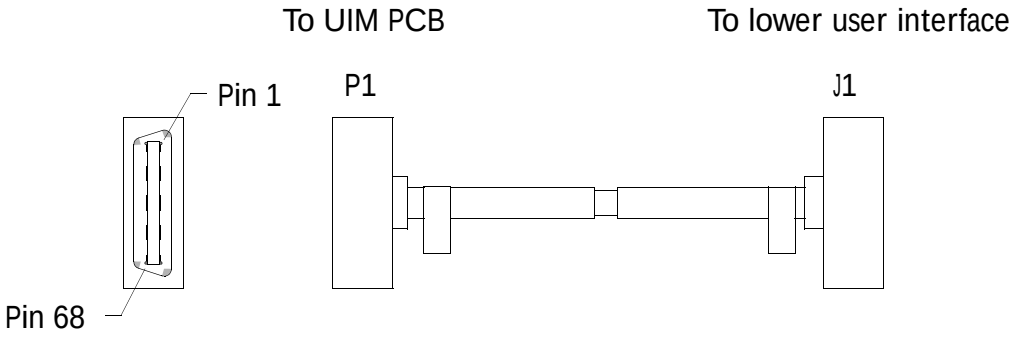


Pin-out Table 10-22
Cable Table 10-1

Table 10-22 Microphone Internal Monitor Cable Assembly (P/N 3500-2752-XX)

From P1	To PCB	Function
P1-3	RED	MIC+
P1-2	BLACK	MIC-
P1-1	SHIELD	SHIELD

Figure 10-29 UIM to Lower User Interface Cable Assembly (P/N 3500-2770-XX)



Front View (Both connector ends)

Pin-out Table 10-23
Cable Table 10-1

Table 10-23 UIM to Lower User Interface Cable Assembly (P/N 3500-2770-XX)

From P1 UIM PCB	To J1 Lower UIF	Function
P1-1	J1-1	L_SENSE_12
P1-2	J1-2	L_SENSE_11
P1-3	J1-3	L_SENSE_09
P1-4	J1-4	L_SENSE_04
P1-5	J1-5	L_SENSE_07
P1-6	J1-6	L_SENSE_06
P1-7	J1-7	L_SENSE_00
P1-8	J1-8	L_SENSE_01
P1-9	J1-9	L_SENSE_03
P1-10	J1-10	TB_YA
P1-11	J1-11	TB_XB
P1-12	J1-12	TB_XA
P1-13	J1-13	L_LED_1
P1-14	J1-14	L_SENSE_15
P1-15	J1-15	L_SCAN_5
P1-16	J1-16	L_SCAN_3
P1-17	J1-17	L_SCAN_0
P1-18	J1-18	L_SCAN_2
P1-19	J1-19	L_SCAN_6
P1-20	J1-20	L_SENSE_14
P1-21	J1-21	L_LED_2

Table 10-23 UIM to Lower User Interface Cable Assembly (P/N 3500-2770-XX) (Continued)

From P1 UIM PCB	To J1 Lower UIF	Function
P1-22	J1-22	DA_4
P1-23	J1-23	DA_5
P1-24	J1-24	DCS1n
P1-25	J1-25	DCS2n
P1-26	J1-26	DCS4n
P1-27	J1-27	AND_CLK
P1-28	J1-28	DD_1
P1-29	J1-29	DD_2
P1-30	J1-30	DD_4
P1-31	J1-31	DD_5
P1-32	J1-32	DA_0
P1-33	J1-33	DD_7
P1-34	J1-34	DA_1
P1-35	J1-35	L_SENSE_10
P1-36	J1-36	GROUND
P1-37	J1-37	L_SENSE_08
P1-38	J1-38	GROUND
P1-39	J1-39	L_SENSE_05
P1-40	J1-40	GROUND
P1-41	J1-41	L_SENSE_02
P1-42	J1-42	GROUND

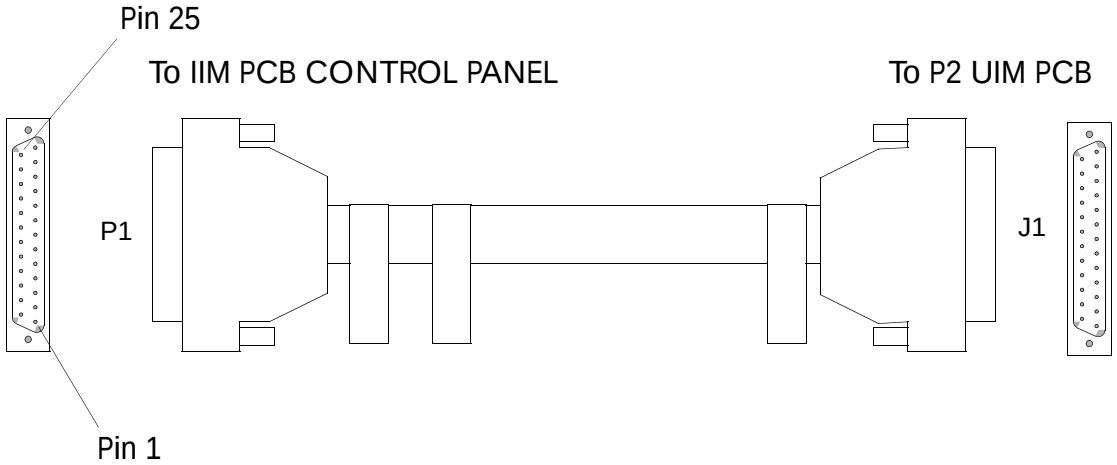
Table 10-23 UIM to Lower User Interface Cable Assembly (P/N 3500-2770-XX) (Continued)

From P1 UIM PCB	To J1 Lower UIF	Function
P1-43	J1-43	TB_YB
P1-44	J1-44	-12 VOLT
P1-45	J1-45	L_LED_3
P1-46	J1-46	-12 VOLT
P1-47	J1-47	L_SENSE_13
P1-48	J1-48	L_SCAN_7
P1-49	J1-49	L_SCAN_1
P1-50	J1-50	+5 VOLT
P1-51	J1-51	L_SCAN_4
P1-52	J1-52	+5 VOLT
P1-53	J1-53	L_LED_8
P1-54	J1-54	+5 VOLT
P1-55	J1-55	DA_3
P1-56	J1-56	+5 VOLT
P1-57	J1-57	DCS0n
P1-58	J1-58	+5 VOLT
P1-59	J1-59	DCS3n
P1-60	J1-60	+5 VOLT
P1-61	J1-61	DD_0
P1-62	J1-62	GROUND
P1-63	J1-63	DD_3

Table 10-23 UIM to Lower User Interface Cable Assembly (P/N 3500-2770-XX) (Continued)

From P1 UIM PCB	To J1 Lower UIF	Function
P1-64	J1-64	GROUND
P1-65	J1-65	DD_6
P1-66	J1-66	GROUND
P1-67	J1-67	DA_2
P1-68	J1-68	GROUND

Figure 10-30 IIM to UIM Cable Assembly (P/N 3500-2771-XX)



Pin-out Table 10-24
Cable Table 10-1

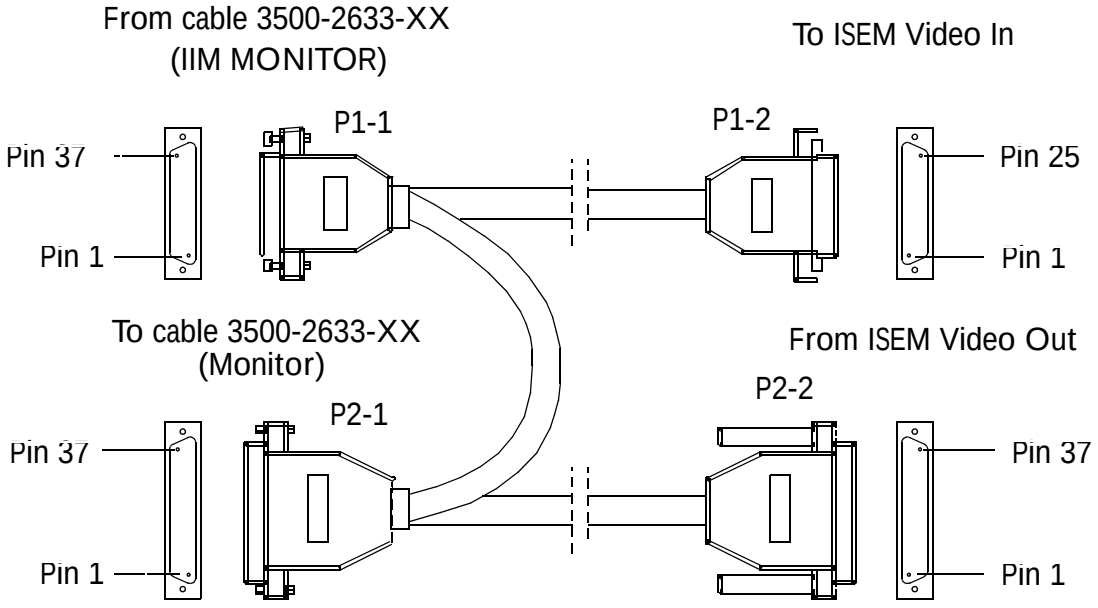
Table 10-24 IIM to UIM Cable Assembly (P/N 3500-2771-XX)

To IIM PCB CONTROL PANEL	To P2 UIM PCB	Function
P1-1	J1-1	+5 VOLT
P1-2	J1-2	+5 VOLT
P1-3	J1-3	+5 VOLT
P1-4	J1-4	+5 VOLT
P1-5	J1-5	+12 VOLT
P1-6	J1-6	-12 VOLT
P1-7	J1-7	No Connection
P1-8	J1-8	ON/STANDBY SWITCH-2
P1-9	J1-9	No Connection
P1-10	J1-10	No Connection
P1-11	J1-11	GROUND
P1-12	J1-12	PIM_CLOCK_UIF
P1-13	J1-13	PIM_DATA_UIF
P1-14	J1-14	GROUND
P1-15	J1-15	GROUND
P1-16	J1-16	GROUND
P1-17	J1-17	GROUND
P1-18	J1-18	GROUND
P1-19	J1-19	GROUND
P1-20	J1-20	SPEAKER LS1
P1-21	J1-21	GROUND

Table 10-24 IIM to UIM Cable Assembly (P/N 3500-2771-XX) (Continued)

To IIM PCB CONTROL PANEL	To P2 UIM PCB	Function
P1-22	J1-22	No Connection
P1-23	J1-23	No Connection
P1-24	J1-24	PIM_STROBE_UIF
P1-25	J1-25	UIF_DATA_PIM

Figure 10-31 ISEM Adapter Cable Assembly (P/N 3500-2772-XX)



Pin-out Table 10-25
Cable Table 10-1

Table 10-25 ISEM Adapter Cable Assembly (P/N 3500-2772-XX)

From P1-1 IIM MONITOR	To P1-2 ISEM Video In	Function
14	14	RED_VIDEO
1	1	RED_RETURN
15	15	GREEN_VIDEO
2	2	GREEN_RETURN
16	16	BLUE_VIDEO
3	3	BLUE_RETURN
17	17	COMPOSITE_SYNC
4	4	SYNC_RETURN
21	21	RIGHT_SPEAKER+
22	22	RIGHT_SPEAKER-
9	9	LEFT_SPEAKER+
10	10	LEFT_SPEAKER-
4	4	GROUND
11	11	UPHONE+
13	13	UPHONE-
12	12	UPHONE_SHIELD

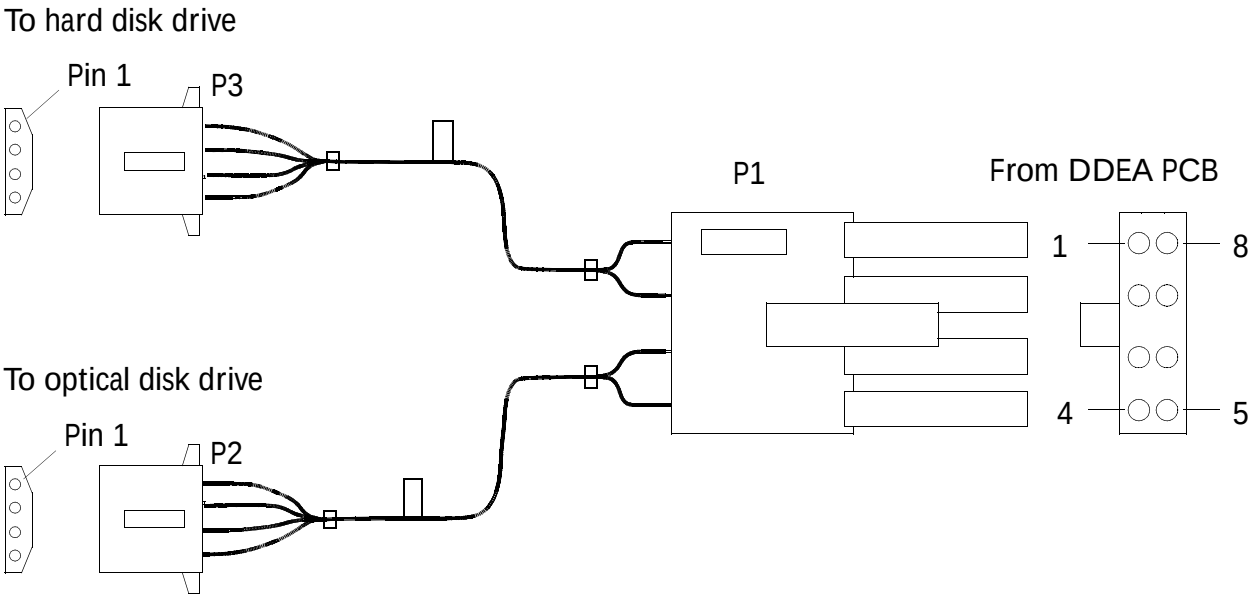
Table 10-25 ISEM Adapter Cable Assembly (P/N 3500-2772-XX) (Continued)

From P2-1 Monitor	To P2-2 ISEM Video Out	Function
19	19	RED_VIDEO
37	37	RED_RETURN
18	18	GREEN_VIDEO
36	36	GREEN_RETURN
17	17	BLUE_VIDEO
35	35	BLUE_RETURN
33	33	COMPOSITE_SYNC
15	15	SYNC_RETURN
21	21	RIGHT_SPEAKER+
2	2	RIGHT_SPEAKER-
20	20	LEFT_SPEAKER+
1	1	LEFT_SPEAKER-
3	3	GROUND
11	11	UPHONE+
30	30	UPHONE-
12	12	UPHONE_SHIELD

Table 10-25 ISEM Adapter Cable Assembly (P/N 3500-2772-XX) (Continued)

From P1-1 Pin	JUMPER To P2-1 Pin	Function
5	7	+12 VOLT
8	6	GROUND
24	5	-12 VOLT
6	4	+5 VOLT
NO CONNECTION	25 CONNECT P2-1 PIN 6	GROUND
19	8	SCL
18	27	SDA
20	9	GROUND

Figure 10-32 Disk Drive Power Cable Assy (P/N 3500-1482-XX)

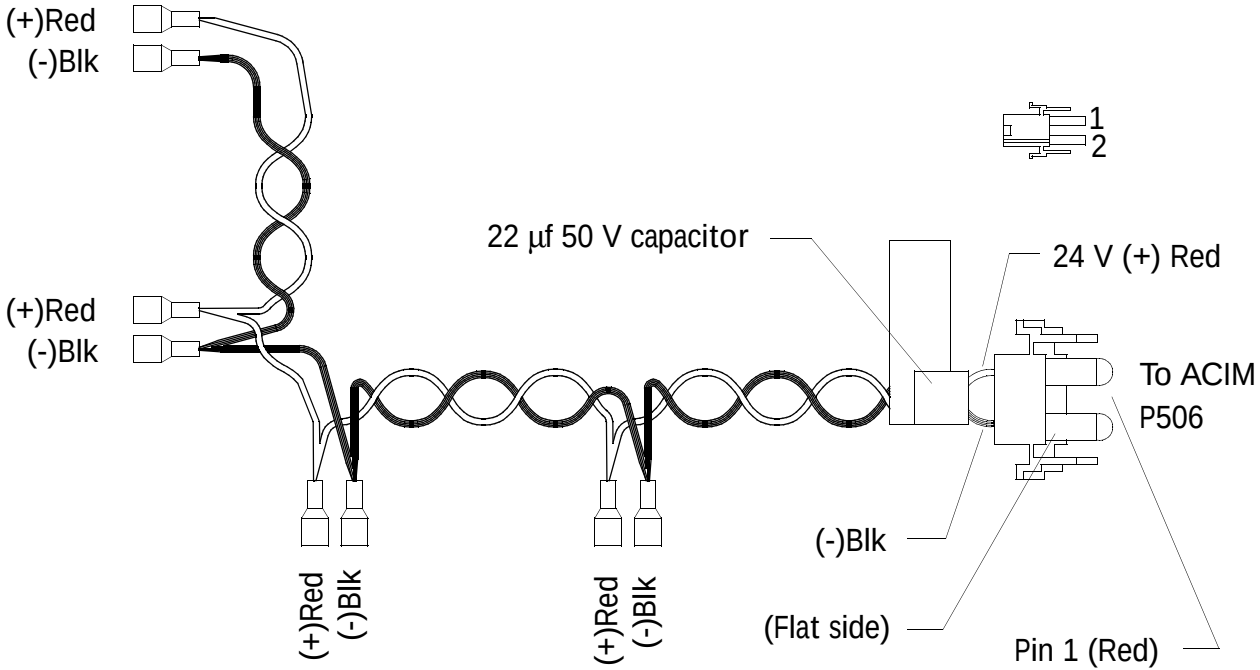


Pin-out Table 10-26
Cable Table 10-2

Table 10-26 Disk Drive Power Cable Assembly (P/N 3500-1482-XX)

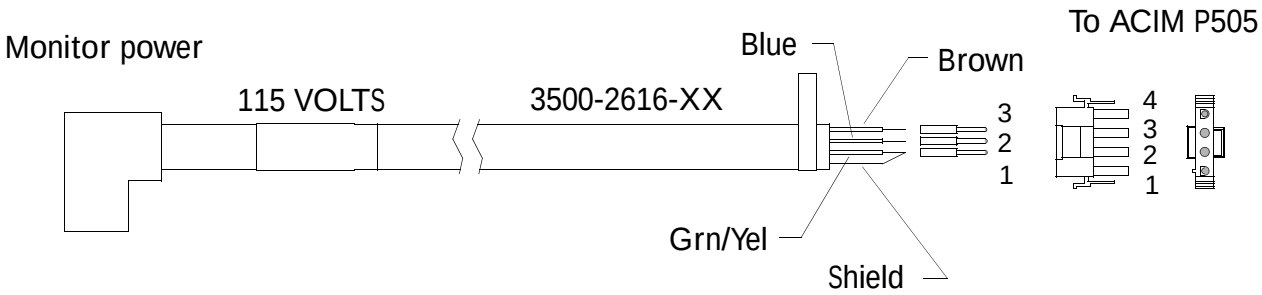
From DDEA PCB	To Optical Drive	To Hard Drive	Function
P1-1	P2-1	-	+12 VDC
P1-2	P2-4	-	+ 5 VDC
P1-3	-	P3-1	+ 12 VDC
P1-4	-	P3-4	+ 5 VDC
P1-5	P2-2	-	+ 12 VDC Return
P1-6	P2-3	-	+ 5 VDC Return
P1-7	-	P3-2	+ 12 VDC Return
P1-8	-	P3-3	+ 5 VDC Return

Figure 10-33 Fan Power Cable Assembly (P/N 3500-1514-XX)



All Black and Red wire pairs go to individual fans.

Figure 10-34 Monitor Power Cable Assembly (P/N 3500-2616-XX)



Pin-out Table 10-27
Cable Table 10-2

Table 10-27 Monitor Power Cable Assembly (P/N 3500-2616-XX)

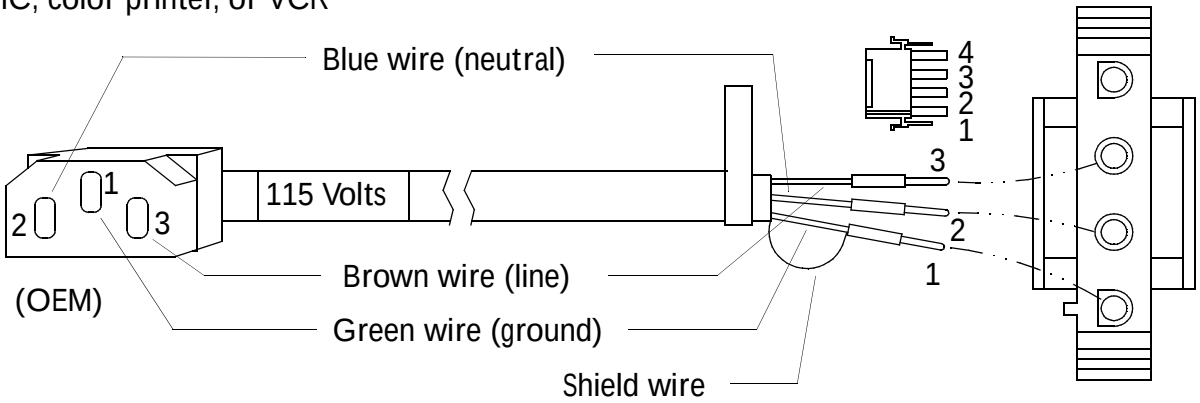
From P505 on ACIM	To Monitor Power Connector	Function
Pin 1	Pin 1	GND from ACIM (Green/Yellow)
Pin 2	Pin 2	Neutral (Blue)
Pin 3	Pin 3	Line Voltage (Brown) 115V

Figure 10-35 OEM Power Cable Assembly, 115 VAC, Internal

3500-1517-XX - AAM 1
3500-1873-XX - MIC or Hardcopy
3500-2780-XX - VCR

To 3500-1578 ACIM:
Hardcopy - P503
VCR - P504

To AAM, MIC, color printer, or VCR



Pin-out Table 10-28
Cable Table 10-2

1 Power cables are not interchangeable. Lengths will vary.

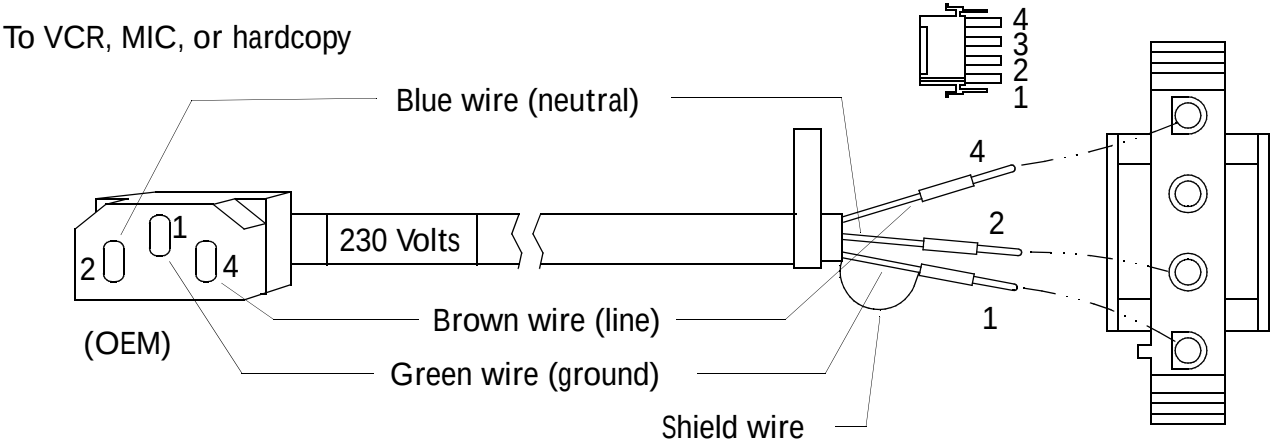
Table 10-28 OEM Power Cable Assembly, 115 VAC, Internal

From P503/P504 on ACIM	To OEM Power Connectors	Function
Pin 1	Pin 1	GND from ACIM (Green/Yellow)
Pin 2	Pin 2	Neutral (Blue)
Pin 3	Pin 3	Line Voltage (Brown) 115V

Figure 10-36 OEM Power Cable Assembly, 230 VAC, Internal

3500-1547-XX - Mitsubishi Color Printer [1]
3500-2397-XX - MIC or Hardcopy
3500-2781-XX - VCR

To 3500-1579/1580 ACIM:
Hardcopy - P503
VCR - P504



Pin-out Table 10-29
Cable Table 10-2

[1] Power cables are not interchangeable. Lengths will vary.

Table 10-29 OEM Power Cable Assembly, 230 VAC, Internal

From P503/P504 on ACIM	To OEM Power Connectors	Function
Pin 1	Pin 1	GND from ACIM (Green/Yellow)
Pin 2	Pin 2	Neutral (Blue)
Pin 4	Pin 4	Line Voltage (Brown) 230V

Figure 10-37 Monitor Internal Cabling Diagram

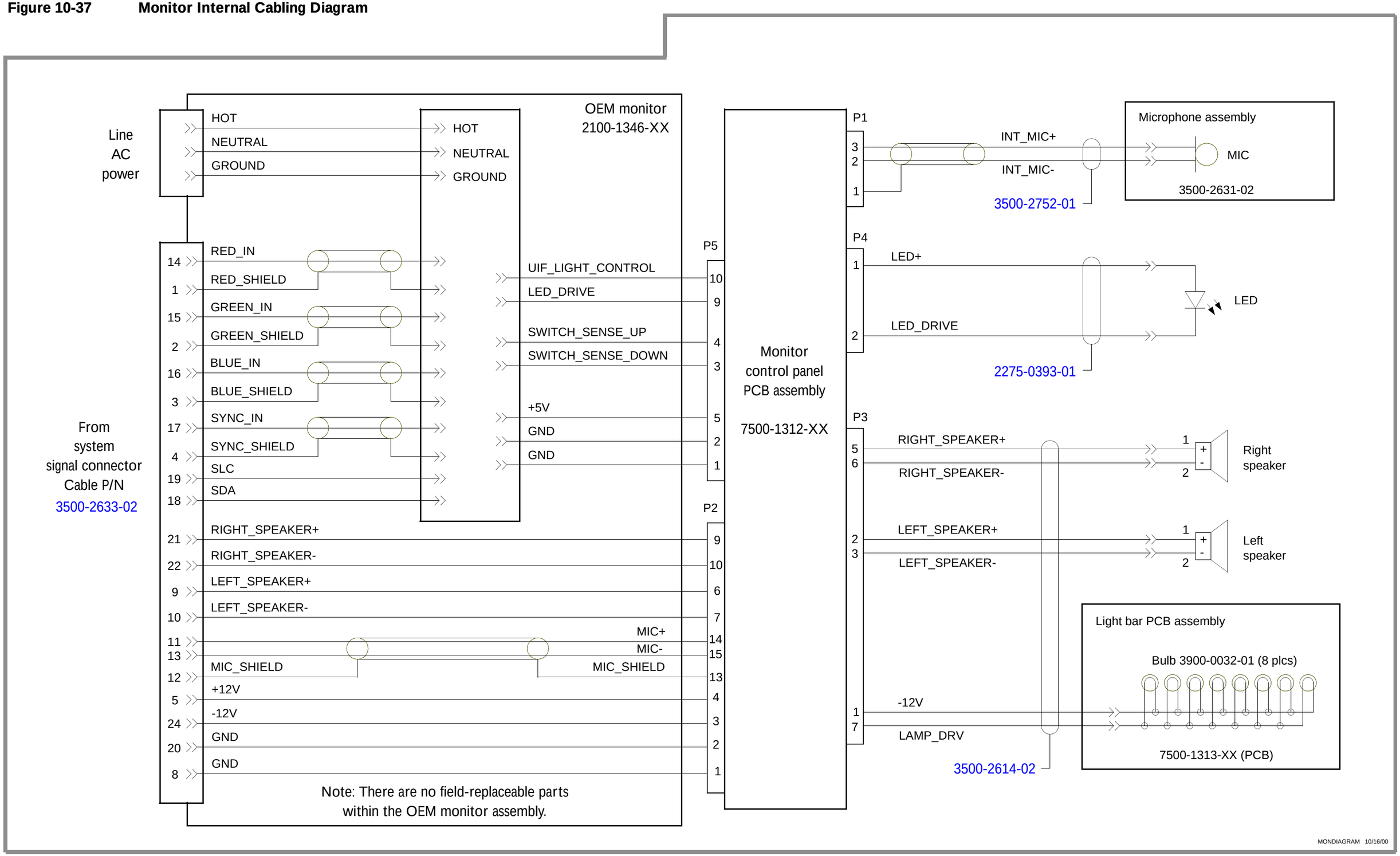


Figure 10-38 Notes for HDI 5000 (Classic) Signal/Power Diagrams

1 2275-0327-XX and 2275-0394-XX = Internal installation 2275-0395-XX and 2275-0396-XX = External installation

2 Do not connect external printer to printer connector on PIM PCB.

3 Part number 4500-5512-01 is an external disk drive test cable.

4 To obtain video loop-through when the ISEM is installed, video is routed from the monitor connector on the IIM PCB to the ISEM Video In and out the ISEM Video Out connector to the monitor. (Two 3500-2633-XX cables are required.)

5 When the ISEM is not installed, only one 3500-2633-XX is required.

6 Mitsubishi printer only.

7 Connect this end to P503 or P504 for UP5600 printer installation.

8 If a UP5600 is installed, disconnect the main transformer connector to P501 on the ACIM. Connect the UP5600 as shown.

9 ON/STANDBY switch controls system logic voltage to turn untrasound system ON & OFF.

Figure 10-39 HDI 5000 (Classic) System Signal Interconnect Diagram

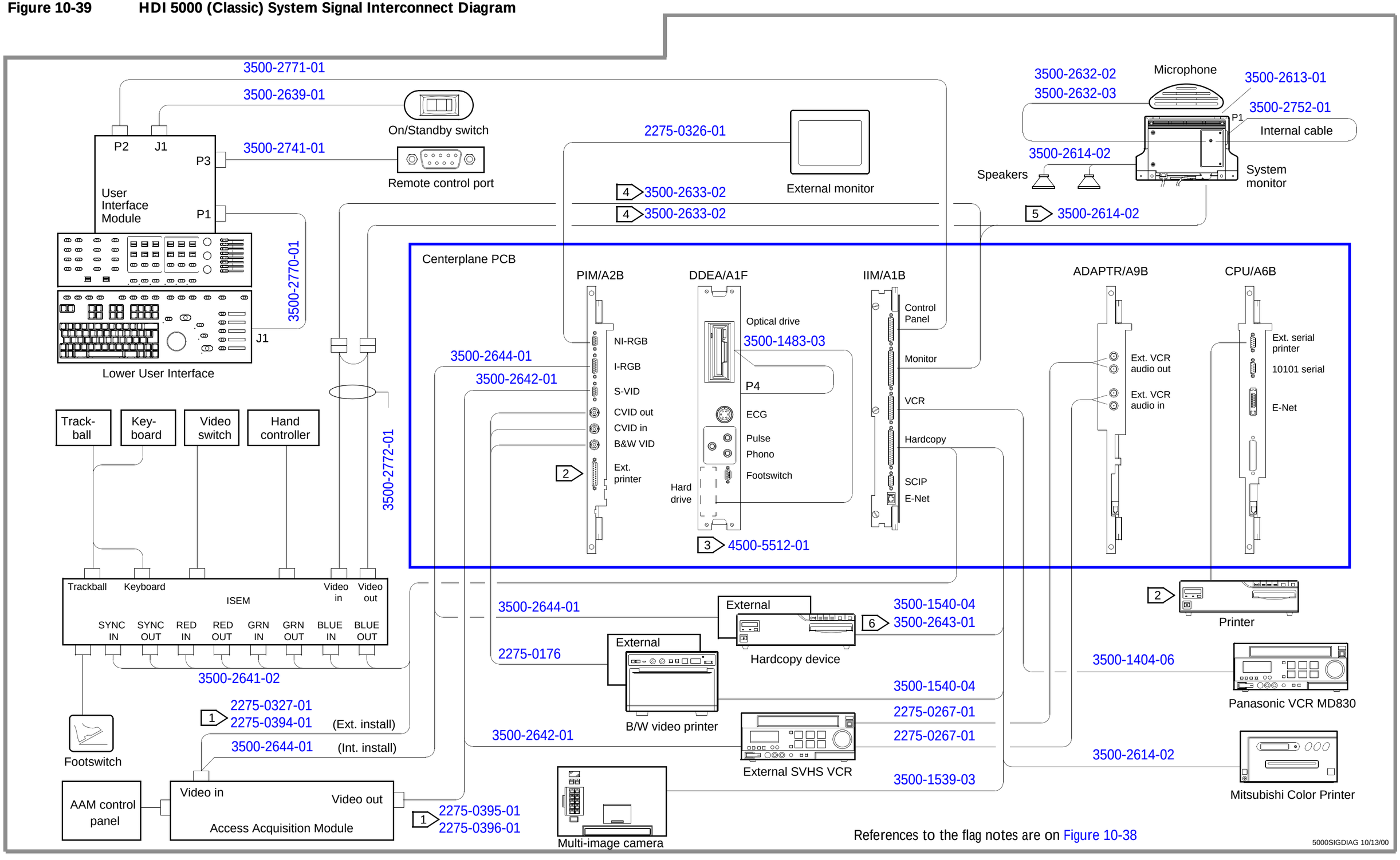


Figure 10-40 HDI 5000 (Classic) System Power Distribution Diagram

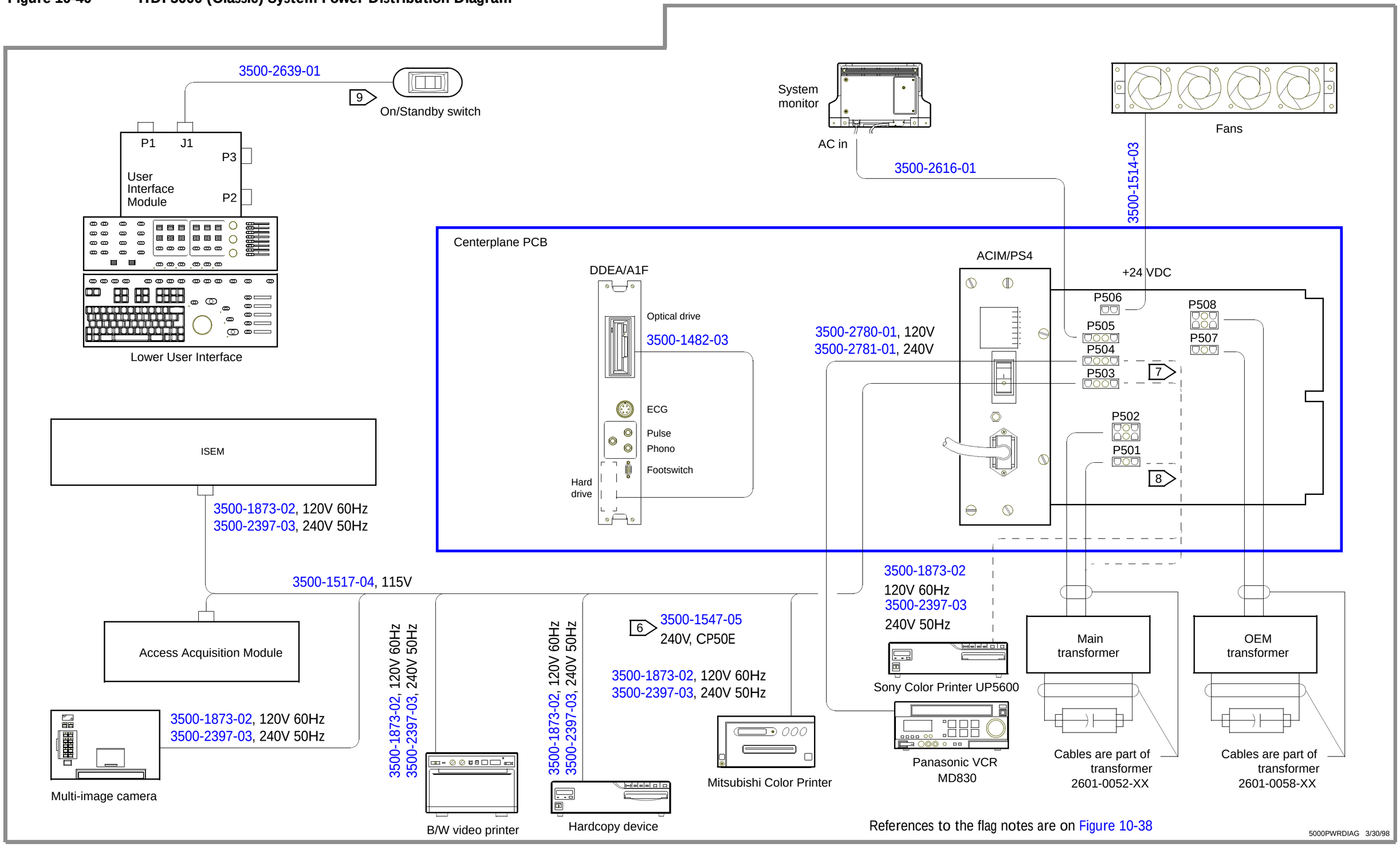


Figure 10-41 Philips HDI 5000 System Signal Interconnect Diagram

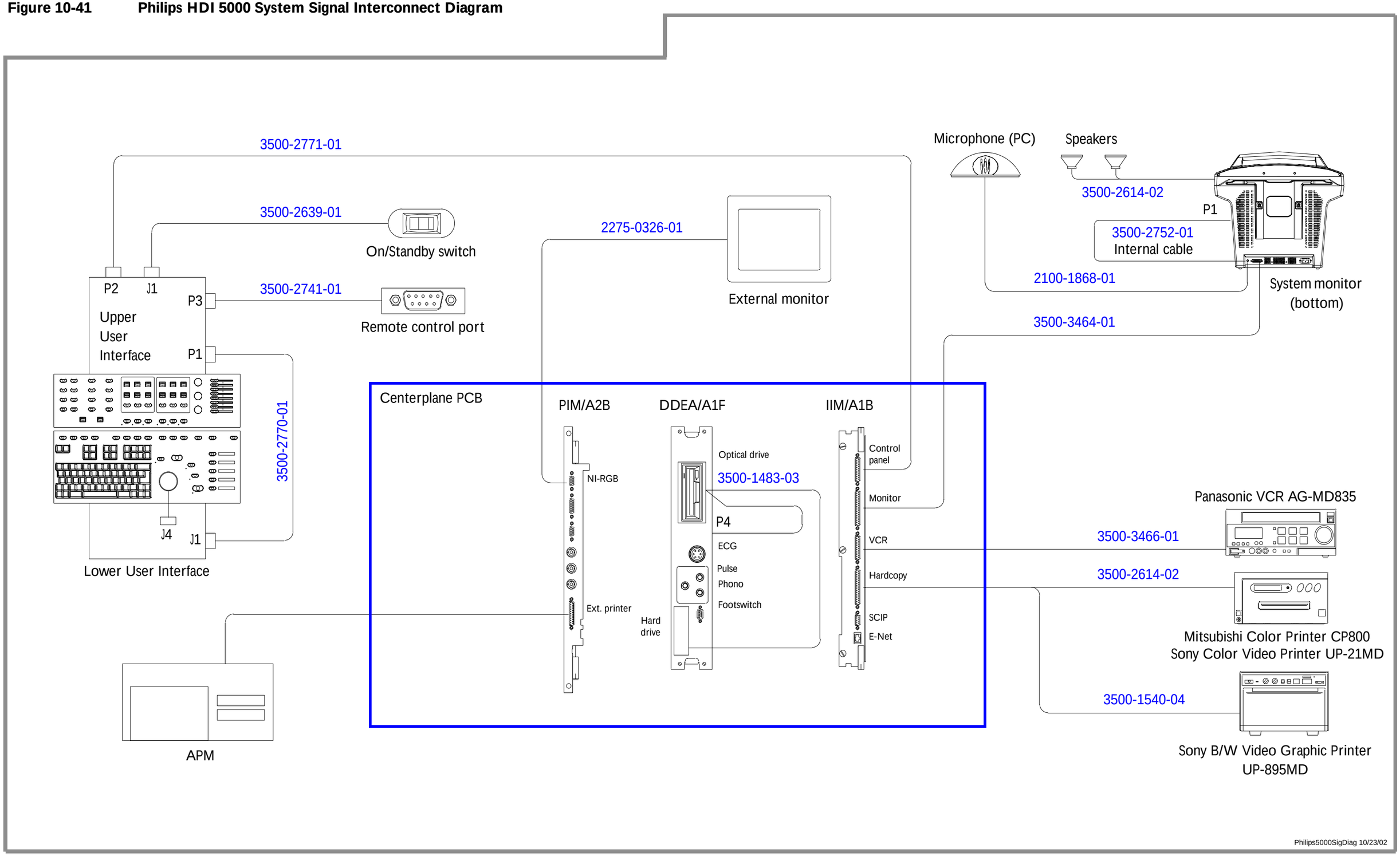
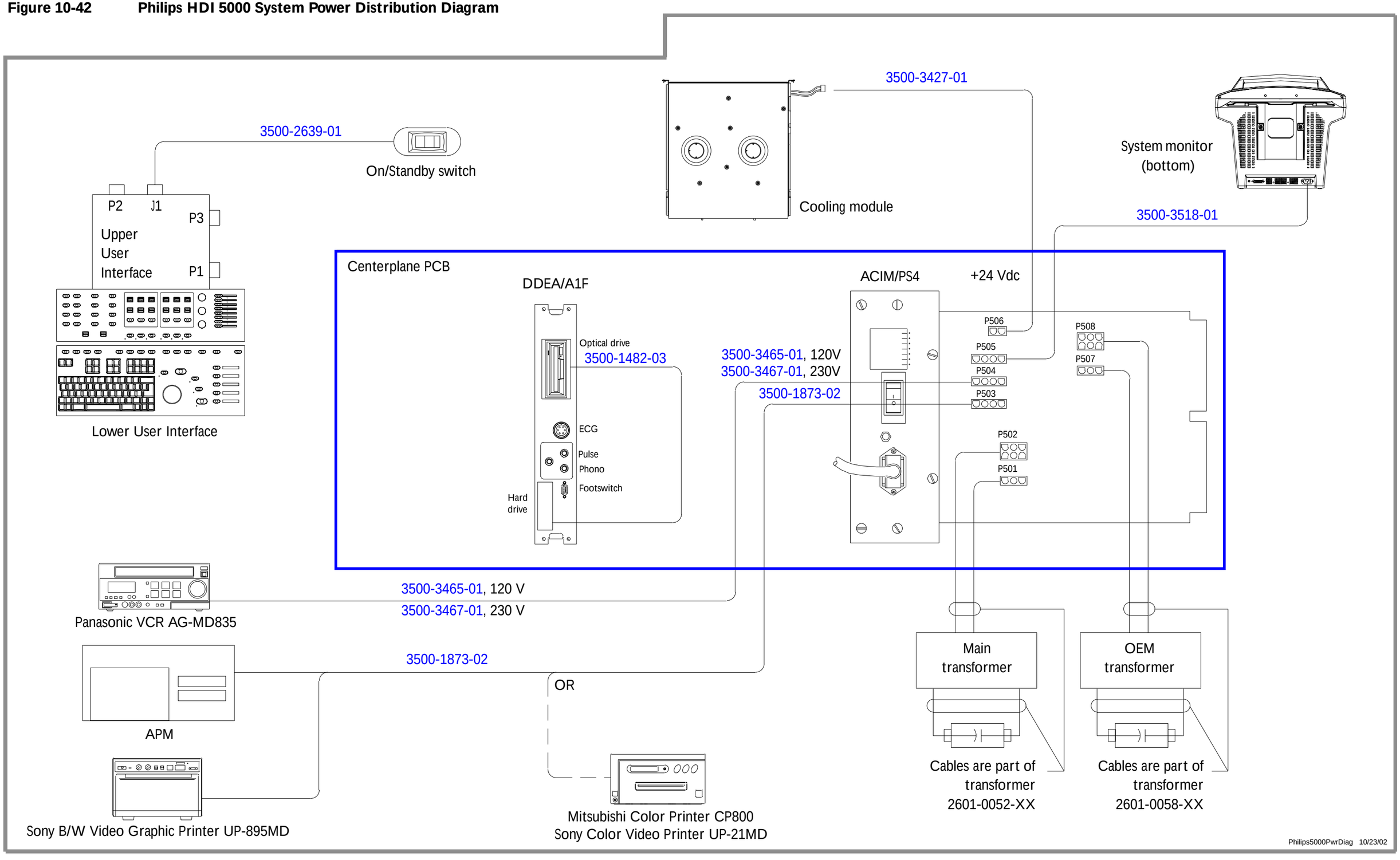


Figure 10-42 Philips HDI 5000 System Power Distribution Diagram



11 Change History

This section lists the software and hardware changes associated with a specific software release number. Unless noted under the Hardware Changes paragraph, the hardware changes are not required for that particular software release.

The part numbers listed after the software versions are the optical disk part numbers for that software version.

107. XX Software Releases

107.10 (10.0)

Released 4252-0799-11 on November 7, 1997

New Features

- Broadband Phased Array Scanheads
  - P3-2 20 mm
  - P5-3 (Radiology applications not supported for initial release.)
  - P6-3
  - P7-4
  - MPT7-4 Multiplane Transesophageal Scanhead
- Broadband Linear Array Scanheads
  - L7-4 40 mm
  - L12-5 38 mm

- Broadband Curved Array Scanheads
  - C5-2 40R
  - C7-4 40R
  - C8-4v 11mm
  - C8-5 14R
  - C9-5 ICT 8 mm Intracavity Scanhead (GYN applications not supported for initial release.)
- Doppler Transducers
  - TCD Static D2 TC
  - D2 Static D2 CW
  - D5 Static D5 CW
  - D10 Static D10 CW
- Miscellaneous Features
  - 3D Grayscale
  - Tissue Harmonic Imaging (P3-2 only)
  - Cardiac Output/Volume Flow

107.11 (10.0b)

Released December 19, 1997.

4252-0810-01	Software files disk
4252-0808-01	Bootable image disk and system software, 230 MB
4252-0809-01	Bootable image disk without software, 128 MB

New Features

Not applicable.

108. XX Software Releases

108.15 (10.0.1)

Released January 29, 1998.

4252-0811-09	Software files disk
4252-0813-04	Bootable Image disk with system software
4252-0814-04	Bootable Image disk without system software

New Features

- C4-2 40 mm Broadband Curved Array
- L10-5 38 mm Broadband Linear Array
- CL10-5 Compact Linear Intraoperative Scanhead
- P5-3 Broadband Phased Array (Radiology applications)
- C9-5 ICT 8 mm Broadband Intracavity Scanhead (OB/GYN applications)
- C5-2 CSI
- C5-2 THI

108.16 (10.0.2)

Released April 24, 1998.

4252-0811-10	Software files disk
4252-0813-05	Bootable Image disk with system software
4252-0814-05	Bootable Image disk without system software

New Features

None.

108.17 (10.0.3)

Released July 31, 1998.

4252-0811-11	Software files disk
4252-0813-06	Bootable Image disk with system software
4252-0814-06	Bootable Image disk without system software

New Features

None.

108.18 (10.0.4)

Released October 15, 1998.

4252-0811-12	Software files disk
4252-0813-07	Bootable Image disk with system software
4252-0814-07	Bootable Image disk without system software

New Features

None.

108.19 (10.0.5)

Released January 28, 2000.

4252-0811-13	Software files disk
4252-0813-08	Bootable Image disk with system software
4252-0814-08	Bootable Image disk without system software

New Features

None.

124. XX Software Release

124.13 (10.1)

Released September 9, 1998.

4252-0815-14	Software files disk
4252-0828-03	Bootable Image disk with system software
4252-0829-03	Bootable Image disk without system software

New Features

- P4-2 Phased Array Scanhead
- Tissue Doppler Imaging (TDI)
- High Pulse Repetition Frequency (HPRF) Doppler Imaging
- Simultaneous 2D/CW
- Pulse Inversion 2D Harmonic Imaging
- Harmonic Imaging
- Advanced 3DI option (only demo systems released - require additional hardware)
- Adult Cardiology clinical option for the CL10-5 scanhead
- Bowel TSI with the Small Parts clinical option for the C7-4, C8-5, L12-5, L10-5, and L7-4 scanheads
- P4-2, P5-3, and P7-4 biopsy guide brackets
- Retrospective loops with CAPTURE softkey
- VCR CTRL softkeys

- 3D UNCAL softkey

125. XX Software Releases

125.09 (10.1.1)

Released November 6, 1998.

4252-0840-05	Software files disk
4252-0841-05	Bootable Image disk with system software
4252-0842-05	Bootable Image disk without system software

New Features

- Italian language software, control panels, and manuals.
- Scandinavian keycap set.
- Scandinavian lower-user interface assemblies to support Danish, Finnish, Norwegian, and Swedish languages. Support for these languages is limited to display of the three characters on the new keycaps. (System software has not been translated.)

125.11 (10.1.1.2)

Released February 16, 1999.

4252-0840-07	Software files disk
4252-0841-07	Bootable Image disk with system software
4252-0842-07	Bootable Image disk without system software

New Features

None.

127. XX Software Releases

127.04 (10.1.2)

Released August 30, 1999.

4252-0867-04	Software files disk
4252-0868-03	Bootable Image disk with system software
4252-0869-03	Bootable Image disk without system software

New Features

- L12-5 50 mm scanhead and Small Parts, Pediatric, Advanced Breast, Cerebrovascular, Peripheral Vascular, Musculoskeletal, and Generic clinical options
- L12-5 50 biopsy guide
- Abdominal surgery clinical option on the LI9-5, LAP L9-5, and CT8-4 scanheads
- Neurosurgery clinical option on the C8-5, P7-4, and CL10-5 scanheads
- CSI improvements to the P4-2 scanhead
- High PRF, TDI, and THI improvements to the MPT7-4 scanhead

127.05 (10.1.3)

Released December 6, 1999.

4252-0867-05	Software files disk
4252-0868-04	Bootable Image disk with system software

New Features

None.

127.09 (10.1.4)

Released December 5, 2000.

4252-0867-08	Software files disk
4252-0868-07	Bootable Image disk with system software

New Feature

Redesigned C8-5 curved array scanhead.

127.13 (10.1.5)

Released October 22, 2001.

4252-0867-12	Software files disk
4252-0868-11	Bootable Image disk with system software

New Features

None.

17X. XX Software Releases

170.30 (10.2)

Released November 22, 1999.

4252-0851-26	Software files disk
4252-0874-06	Bootable Image install disk with system software
4252-0873-05	Bootable Image disk installation MO disk

New Features

- All features released with 127.xx software

- SonoCT Real-Time Compound Imaging on the L12-5 38 mm and L12-5 50 mm scanheads for breast, musculoskeletal, vascular, and small parts imaging applications
- Extended gain-range on selected
- 3D acquisition with the MPT7-4 scanhead and the ability to export data for off-line rendering (TomTec or other vendors)
- Biplane TEE (BPT9-5) for pediatric cardiac applications
- Connectivity enhancements including Worklist (automatic input of patient header information from hospital HIS/RIS systems)
- Analysis and calculations enhancements (Power Calcs)
- THI on the P6-3 and C7-4 scanheads for radiology applications
- Real-Time Perfusion Imaging on P4-2
- THI improvements to the C5-2 and L7-4 scanheads
- TDI improvements (blending control and improved lateral gain compensation)
- UpLink enhancements (supports version 2.0)
- Temporary options capability
- ECG trigger user interface improvements
- New high performance color processing
- Color Smoothing control
- Power Harmonics on the C5-2 scanhead
- Graphics key on lower-user interface
- 3D Optimization key on lower-user interface
- CPA Dynamic Motion Differentiation

- Color box behavior changed so the system continues to scan at the previous location until the color box movement stops
- Added a faster sweep speed

170.31 (10.2.1)

Released December 30, 1999.

4252-0851-27	Software files disk
4252-0874-07	Bootable Image install disk with system software
4252-0873-06	Bootable Image disk installation MO disk

New Features

None.

177.13 (10.2.5)

Released May 4, 2000.

4252-0878-19	Software files disk
4252-0888-06	Bootable Image install disk with system software

New Features

- Digital Video Streaming (DVS) option
  - Streaming of compressed digital data to and from the DVS hard drive (up to one minute of video at 30 Hz rate)
  - Digital and Stress Echo options
  - Flexible protocol engine
  - JPEG compression
  - RLE (Run Length Encoding) compression for DICOM
  - DICOM disk support

  - Seamless video switching
  - Control of DVS features using the ultrasound system user interface
  - Seamless passing of patient demographics
  - Calibration of images for measurement
- Intelligent Frame Rate Accelerator (Multi-line feature)
- DICOM Modality Performed Procedure Step (MPPS) feature (on non-DVS systems)
- DICOM Storage Commit (SC) feature (on non-DVS systems)

178.04 (10.2.6)

Released July 14, 2000.

4252-0899-03	Software files disk
4252-0900-03	Bootable Image install disk with system software

New Features

None.

185. XX Software Release

185.21 (10.3)

Released November 6, 2000.

4252-0901-13	Software files disk
4252-0902-09	Bootable Image install disk with system software

New Features

- P12-5 Phased Array Scanhead

- Redesigned C8-5 curved array scanhead
- SonoCT Real-time Compound Imaging for L7-4, C5-2, and C7-4 Scanheads is added
- The number of multi-line apertures maximized for the P5-3 and MPT7-4 scanheads
- Multi-line support added on the C8-4v and C5-2 scanheads
- 2D Enhancements
  - Addition of Tissue Harmonic Imaging on the P4-2 scanhead for General Imaging, and on the C8-4v scanhead
  - Improved penetration on the P4-2, C5-2, and C8-4v scanheads
  - Addition of OB Tissue Specific presets to the L12-5 38 mm and L12-5 50 mm scanheads
- Contrast Enhancements
  - Two Tissue Specific presets added for the P4-2 scanhead: Power Pulse Inv. 1 (for Optison contrast agents); and Power Pulse Inv. 2 (for Definity contrast agents)
  - Low mechanical index (MI) value for the P4-2 scanhead is now displayed, and can be changed, while using Flash Imaging
  - Power Pulse Inversion added for the L7-4 and the C5-2 scanheads
  - The HRES setting uses multi-line for the C5-2 scanhead

190. XX Software Releases

190.13 (10.3.5)

Released February 15, 2001.

4252-0913-11	Software files disk
4252-0914-11	Bootable Image install disk with system software

New Features

- Intraoperative CL15-7 Broadband Linear Array Scanhead
- C5-2 penetration improvement
- Advanced Processing Module (APM)
- Panoramic Imaging (requires APM)
- Advanced 3D Imaging on all scanheads except biplane (requires APM)
- DVS DICOM Store
- DVS Automatic Scaling
- DVS enhanced Trim
- DVS 2.0 HW Option (includes 850 MHz CPU, new motherboard, CPU fan, and a new SCSI card to speed up system response)

190.14 (10.3.6)

Released April 06, 2001.

4252-0913-12	Software files disk
4252-0914-12	Bootable image install disk with system software

New Features

None.

190.16 (10.3.7)

Released January 17, 2002.

4252-0913-14	Software files disk
4252-0914-14	Bootable image install disk with system software

New Features

None.

190.17 (10.3.8)

Released May 24, 2002.

4252-0913-15	Software files disk
4252-0914-15	Bootable image install disk with system software

New Features

None.

195. XX Software Releases

195.25 (10.4)

Released October 8, 2001.

4252-0946-22	Software files disk
4252-0947-16	Bootable image install disk with system software

New Features

- BPTRT9-5 Broadband Dual Array Scanhead
- XRes Image Processing
- Curved distance measurements
- Pediatric clinical option for the P12-5 scanhead
- Assisted Border Detection tool
- Worklist

- Qualitative Wall Motion Scoring
- Contrast imaging enhancements

195.27 (10.4.1)

Released November 16, 2001.

4252-0946-24	Software files disk

NOTE There are no upgrades for this software version. The boot image disk with system software cannot be ordered. If you need to order system software, order a hard drive with the software pre-installed.

New Features

None.

195.29 (10.4.2)

Released February 2, 2002.

4252-0946-26	Software files disk
4252-0946-20	Bootable image install disk with system software

New Features

None.

195.31 (10.4.3)

Released March 22, 2002.

4252-0946-28	Software files disk
4252-0947-22	Bootable image install disk with system software

New Features

None.

198. XX Software Releases

198.06 (10.4.5)

Released May 31, 2002.

4252-0963-03	Software files disk
4252-0964-03	Bootable image install disk with system software

New Features

P4-1 Broadband abdominal phased array scanhead and dual track biopsy guide

198.06 (10.4.5.1)

Released October 1, 2002.

NOTE System software remains at 4252-0963-03 (198.06) for this release.

New Features

None.

200. XX Software Releases

200.23 (10.5)

Released October 22, 2002.

4252-0977-07	Software files disk
4252-0978-07	Bootable image install disk with system software

New Features

- iSCAN Intelligent Optimization
- XRes imaging on the CL15-7, CL10-5, P6-3, C8-5, C8-5 (ATL), C9-5, P12-5, and BPTRT scanheads
- XRes performance enhancements (for PAL systems only, requires APM 2.0)
- Contrast Enhancements
  - Contrast on CT8-4 scanhead
  - Contrast on P4-1 scanhead
  - P4-1 Power Pulse Inversion harmonic imaging and Pulse Inversion Harmonic imaging
  - Image enhancement on the P4-1, P4-2, C5-2, L7-4, and L12-5 scanheads
  - P4-2 and C5-2 scanhead contrast improvements
  - L7-4 scanhead breast contrast improvements
  - Agent Detection Imaging (ADI)
  - Optimized contrast defaults
- SonoCT Real-time Compound Imaging for C8-5, C8-5 (ATL), C9-5, and C8-4v scanheads
- Password-protected access to images on the hard drive
- Endo 12-5 Endoscopic scanhead capability for non-revenue systems (sales demo and marketing)
- Penetration improvements on the C8-4v scanhead (Fundamental PEN)
- Connectivity performance enhancements
- New Philips bootup screen

200.24 (10.5.0.5)

Released October 31, 2002.

4252-0977-08	Software files disk
4252-0978-08	Bootable image install disk with system software

NOTE Part numbers for DVS and APM software did not change from the previous software version 200.23.

New Features

- MicroVascular Imaging (MVI)
- Extended Loop Capture (ELC)

10.5.1

Released November 18, 2002.

The 10.5.1 release is a hardware-only release. System software remains at 200.24.

New Features

- Ergonomic and cosmetic changes
  - Monitor forward/backward and side-to-side (rotation) articulation capabilities
  - Built-in monitor handle
  - Integrated handles on the front and rear of the system
  - Front foot rest
  - OEM platform on the rear of the command module
  - Scanhead cable hooks below the lower user interface
  - Power cable hook on the rear of the command module
- HDI speed-up option (includes new CPU and SPM PCBs)

- DVS 2.0 or APM 2.0
- Redesigned fan module
- Philips colors and branding

12 Parts

Introduction

This section contains parts information for the HDI 5000 and Philips HDI 5000 systems.

Use the figures and parts table in this section to locate and identify system parts. Part numbers are shown on the illustrations as well as listed and described in the corresponding tables. Figures are keyed to the tables and the tables to the figures, as applicable. Use the part number and description provided as needed to order a part. Verify the level of replacement for a given part is in accordance with current service philosophy before ordering the part.

Please see “Using the Figures and Tables” on page 372.

Parts Ordering Information

Field Service Engineers

For parts ordering procedures, FSEs should refer to their standard operating procedures.

Customers

Customers may order parts through an FSE or directly from the Customer Service Order Processing Department. Customers ordering parts through an FSE will need to provide the following information:

- Shipping address
- Purchase order number of equipment
- Part numbers or sales order numbers
- Part descriptions and quantity needed

How to Find a Part Number

In this section, part numbers in the exploded view system illustrations (figures) point to the system parts. The part numbers in these figures link to the parts table (Table 12-1) containing descriptive information about the part. The parts table, arranged as follows, is alphabetized by description for your convenience. Separate tables list system accessories (Table 12-2) and peripherals (Table 12-3).

Using the Figures and Tables

➤ **How to use the figures and tables in this section**

- Start your parts search by navigating to one of the system parts locator "maps."
  - Figure 12-1 provides links to the HDI 5000 (classic) parts. A button in the lower left corner of this figure links to the Philips parts locator map.
  - Figure 12-57 provides links to the Philips HDI 5000 parts. A button in the lower left corner of this figure links to the classic parts locator map.
- If you need a part number, find the drawing of the part in the appropriate figure. The part number, or reference to a detail figure where the part number appears, points to the drawing. If you need the part description, clicking the blue part number hypertext link takes you to the corresponding item in the parts table where the description is provided.
- If you have the part number and want to look up the description in the table, use Acrobat Reader's **Find** function to locate the part number. Then, clicking that blue hypertext link takes you to the corresponding item in the parts table.
- If you are using a printed version of this manual and need more than just the part number shown on the figure, use the alphabetization feature of the parts table: Consider the part name and look it up in the description column.

Parts Table Definitions

Located On This column lists all of the figures on which the part is found.

Part Number This column lists the part number for an item. Use this number when ordering parts from Philips Ultrasound. If a table is referenced in this column, the part number is on that table. Cable part numbers may be in Section 10, “Cabling”.

Part Description The name or common description of the item is listed here. Where appropriate, the description column also includes size, tolerance, type or model, and material data for the part. Table 12-1 and Table 12-2 are alphabetized by this column. Table 12-3 is alphabetized by OEM Description.

Attaching parts must be ordered separately. They are not provided with the assembly, subassembly, or component being attached.

Notes/Reference Manufacturer's part numbers, sometimes alternate part numbers, special applications, and other information pertaining to a specific part are listed in the Notes/Reference column. For top assemblies containing many replaceable parts, the applicable figure or table for further breakdown of parts is listed here.

Figure Definitions

3500-0000-00 **Part Number** The part number for each part or subassembly shown in an illustration is a hypertext cross-reference linking to the parts/cable tables containing parts descriptions and additional information.

See Figure 14-X **See Figure** "See Figure" is a hypertext cross-reference link to a detail (sub-assembly) figure. In the sub-assembly figure you will find either the part number, reference to another detail figure, or a reference to the table containing parts descriptions and additional information.

SYSTEM VIEW **System View Illustration Label** The "SYSTEM VIEW" (System Parts Locator Map), Figure 12-1, and Figure 12-57 contain links to "PARENT VIEW" illustrations.

PARENT VIEW **Parent View Illustration Label** "PARENT VIEW" indicates an illustration that provides links to additional parts breakdown, indicated with a "See Figure" reference.

System View Button The "System View" button is a hypertext cross-reference link to the "SYSTEM VIEW" (System Parts Locator Map). You can return to the "SYSTEM VIEW" (System Parts Locator Map) by clicking the "System View" button in the lower left corner of any figure in this section.

Parent View Button The "Parent View" button is a hypertext link to the parent-part or "PARENT VIEW" illustration.

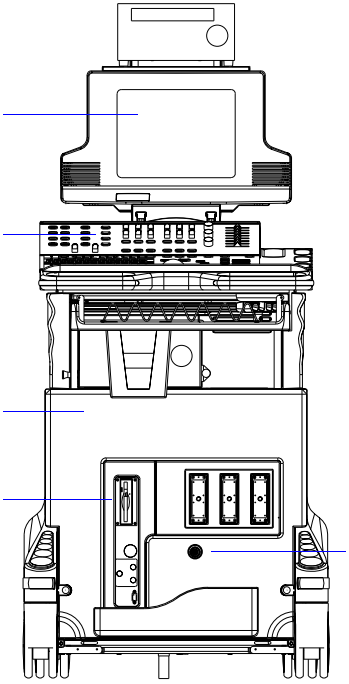
Parts List Button The "Parts List" button (located on the "System Parts Locator Maps" only) is a hypertext cross-reference linking to the "Parts Table" containing parts descriptions and additional information. The "Parts List" can also be accessed by clicking on one of the blue part numbers in any of the figures in this section.

Green Arrow The green arrows found throughout the parts illustrations are used to indicate movement (assembly, disassembly, rotation), or point to a specific area (details, breakdowns).

Illustrations

Figure 12-1 HDI 5000 (classic) Ultrasound System Parts Locator Map (Front and Rear Ends)

SYSTEM VIEW



Video monitor
See Figure 12-26

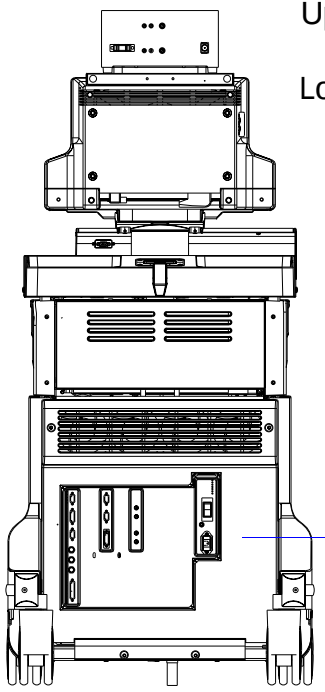
Command module
See Figure 12-36

Front compartment
See Figure 12-6

Card cage
See Figure 12-8

Footswitch
See Figure 12-53

- Front -



- Rear -

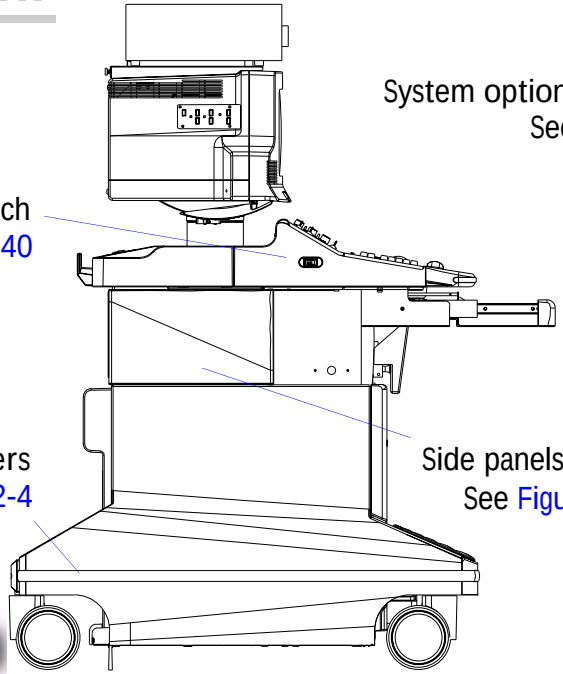
System Labels
Upper See Figure 12-54
Mid See Figure 12-55
Lower See Figure 12-56

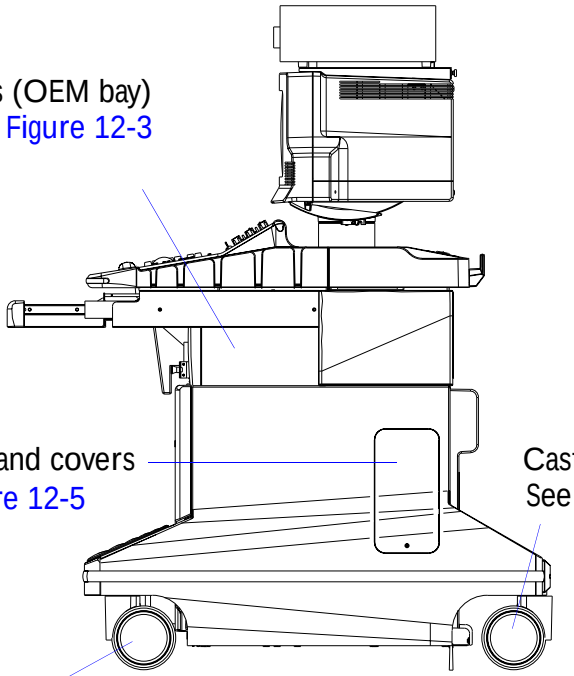
Rear compartment
See Figure 12-18

Parts List
Philips Map
Side Views

Figure 12-2 HDI 5000 (classic) Ultrasound System Parts Locator Map (Left and Right Sides)

SYSTEM VIEW





System options (OEM bay)
See Figure 12-3

Power switch
See Figure 12-40

Pads and bumpers
See Figure 12-4

Side panels and covers
See Figure 12-5

Casters, axle type
See Figure 12-52

Casters, swivel type
See Figure 12-51

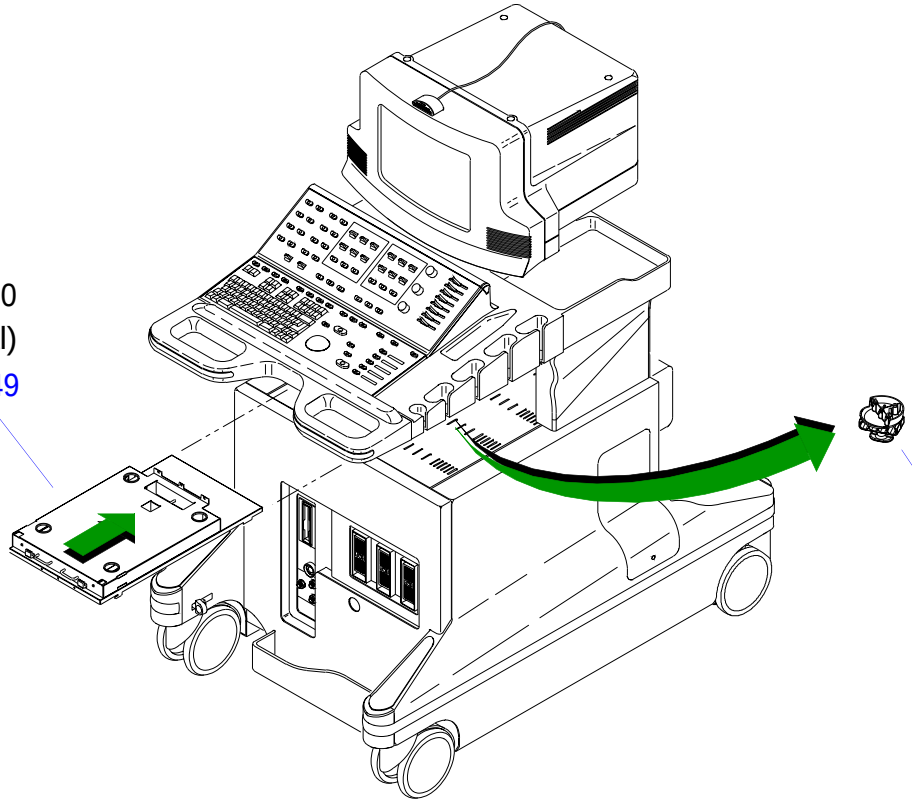
- Left -

- Right -

Parts List
Philips Map
End Views

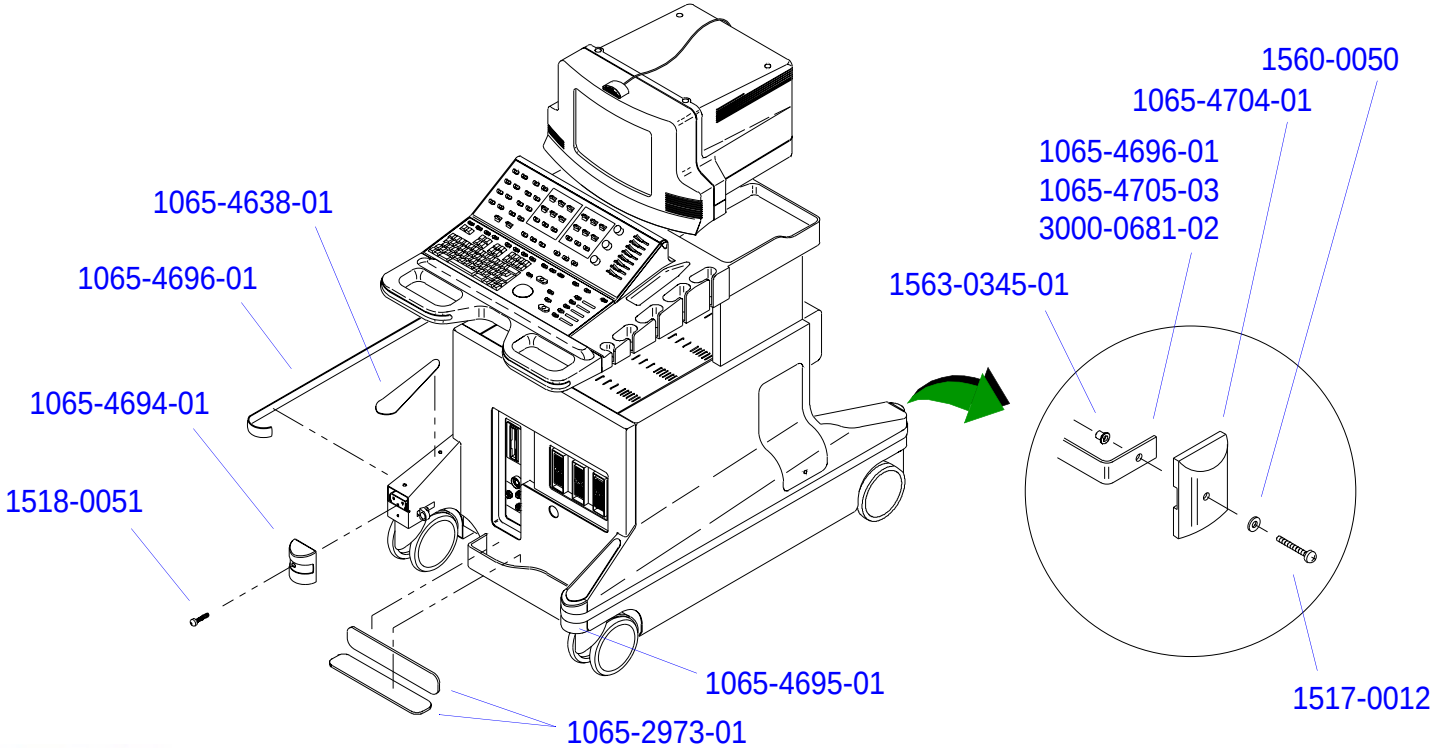
Figure 12-3 HDI 5000 System Options

PRIMARY VIEW



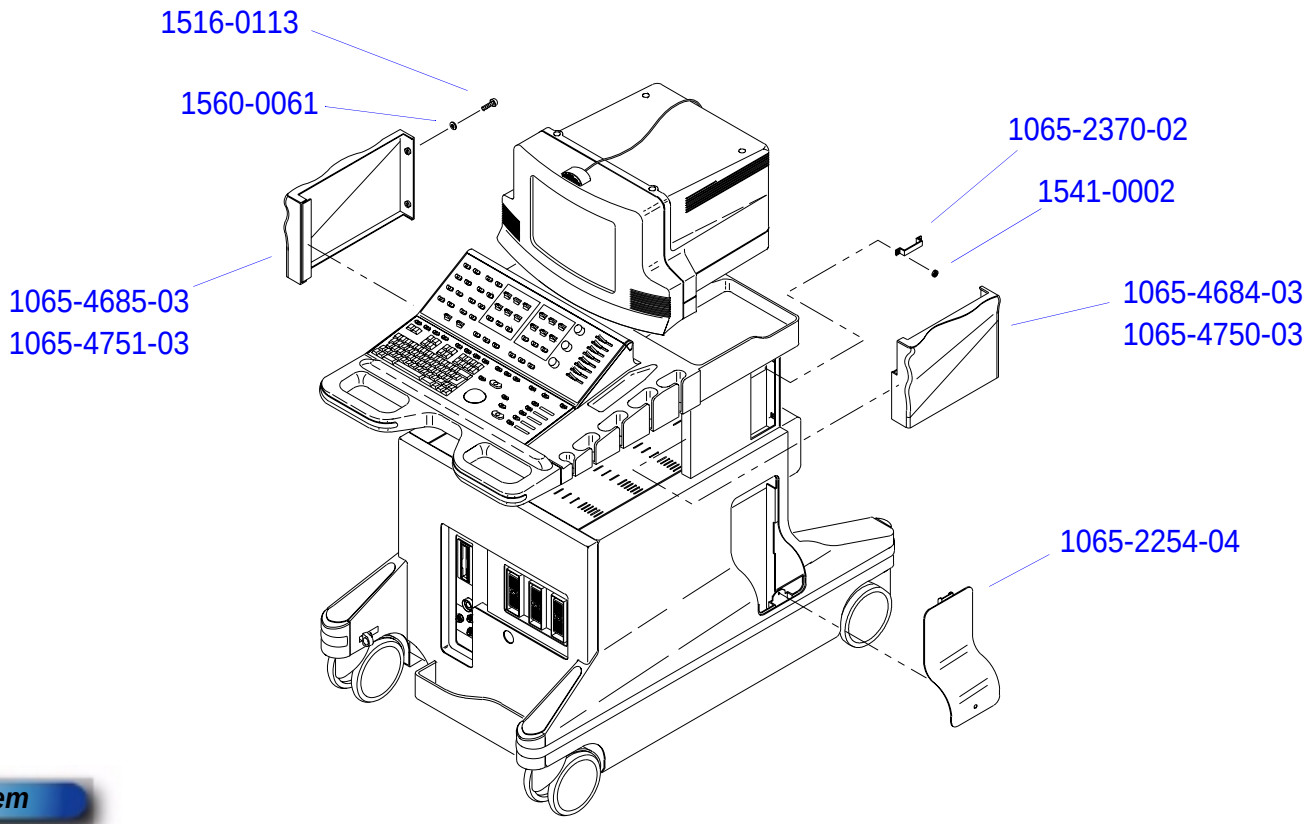
System

Figure 12-4 Pads and Bumpers



System

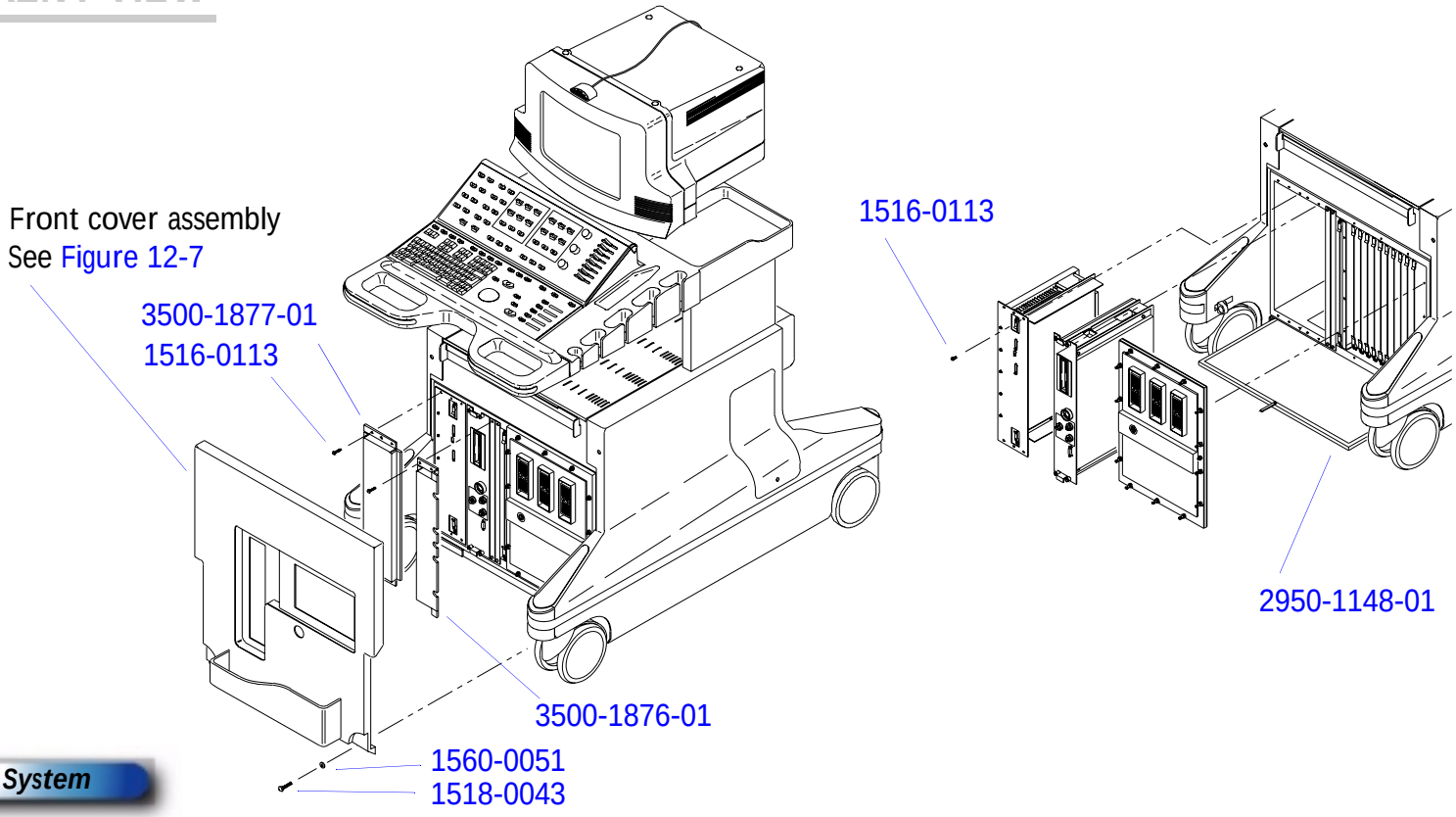
Figure 12-5 Side Panels and Covers



System

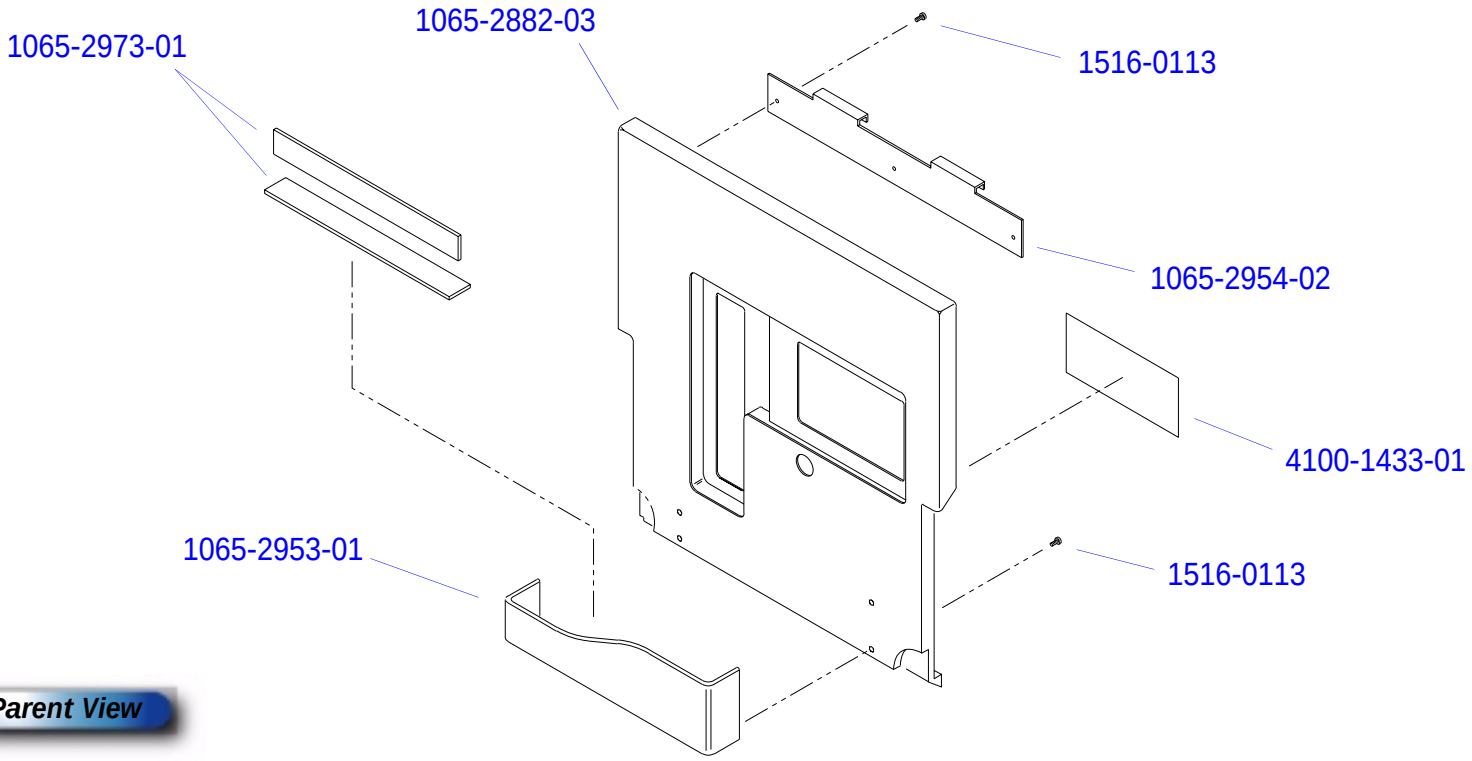
Figure 12-6 Front Compartment

PARENT VIEW



System

Figure 12-7 Front Cover Assembly



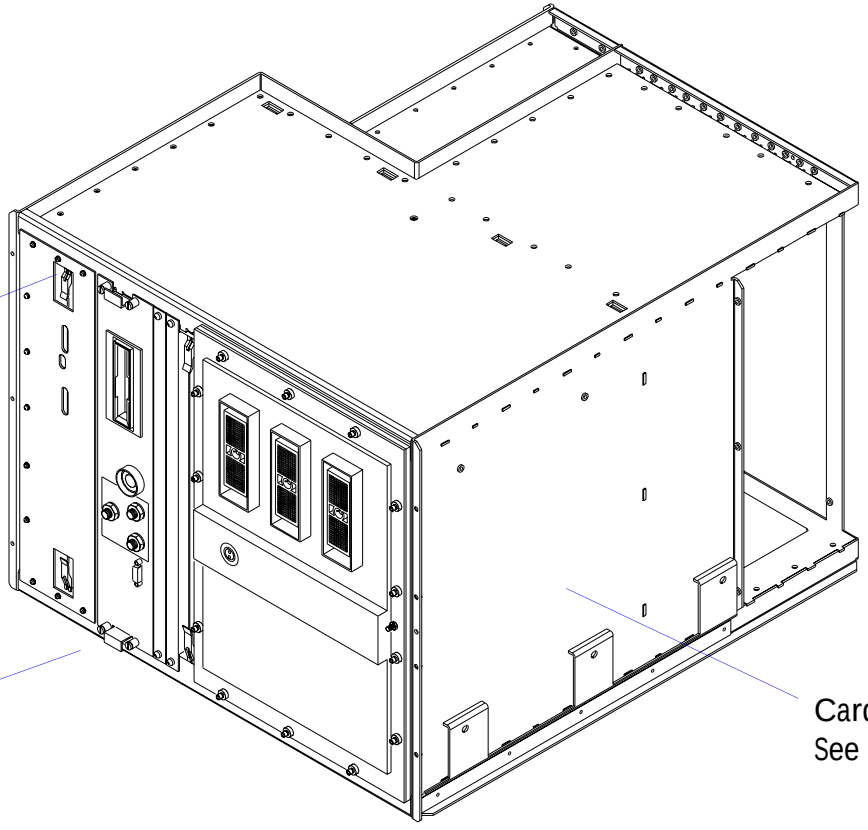
Parent View

System

Front cover assembly
3500-2850-02

Figure 12-8 Card Cage

PARENT VIEW

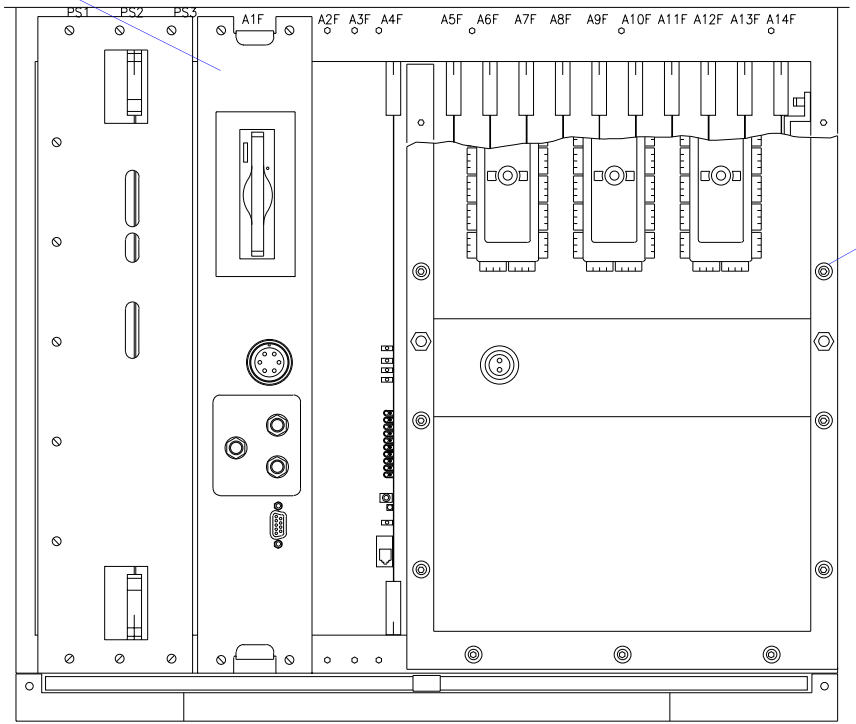


System

Figure 12-9 PCBs and Modules (Front Card Cage)

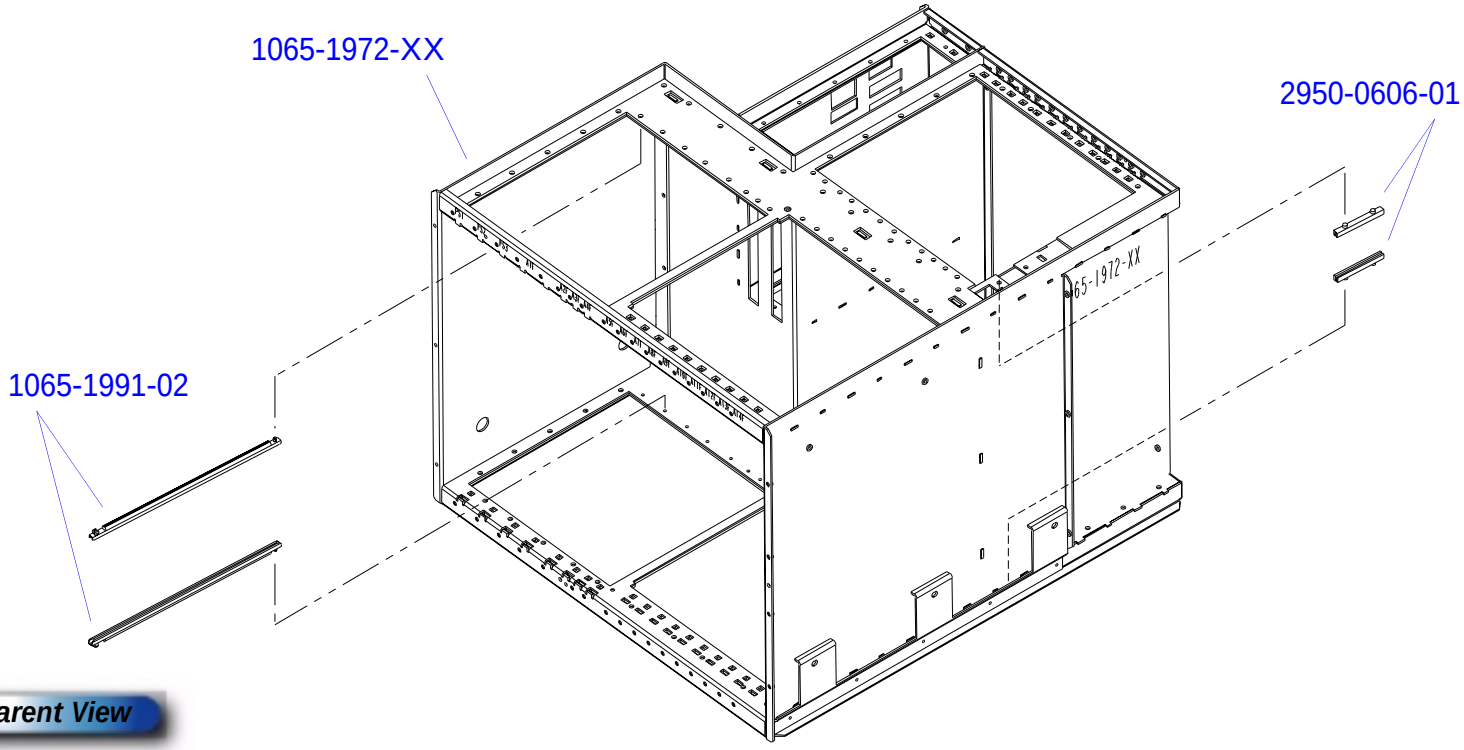
DDEA module assembly
Without ECG
See Figure 12-12
Physio
See Figure 12-13
Without MO drive
See Figure 12-14
Without ECG, MO and physio
See Figure 12-15

Call your Philips representative for the part number and compatible software version of system PCBs.



Parent View
System

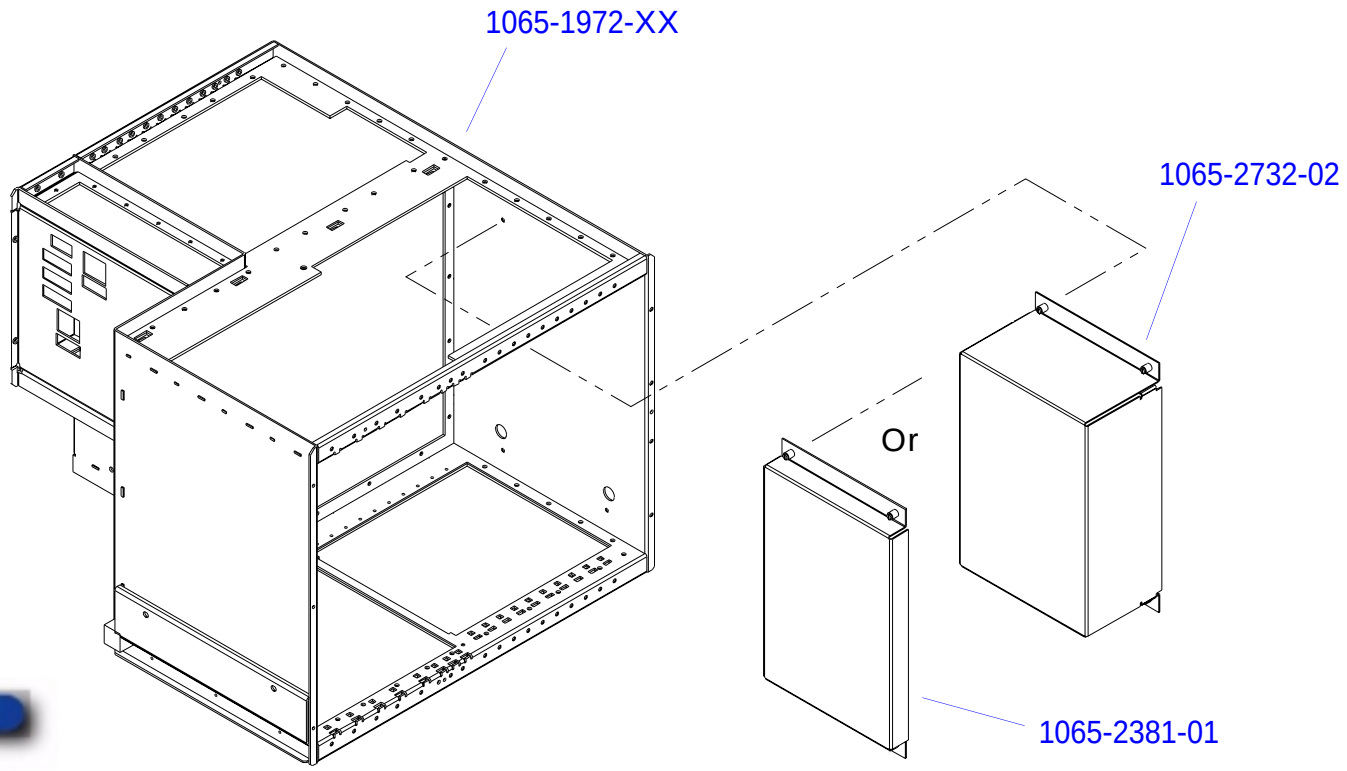
Figure 12-10 Card Guides



Parent View

System

Figure 12-11 Card Cage Air Deflector



Parent View

System

Figure 12-12 DDEA Module Assembly (Without ECG)

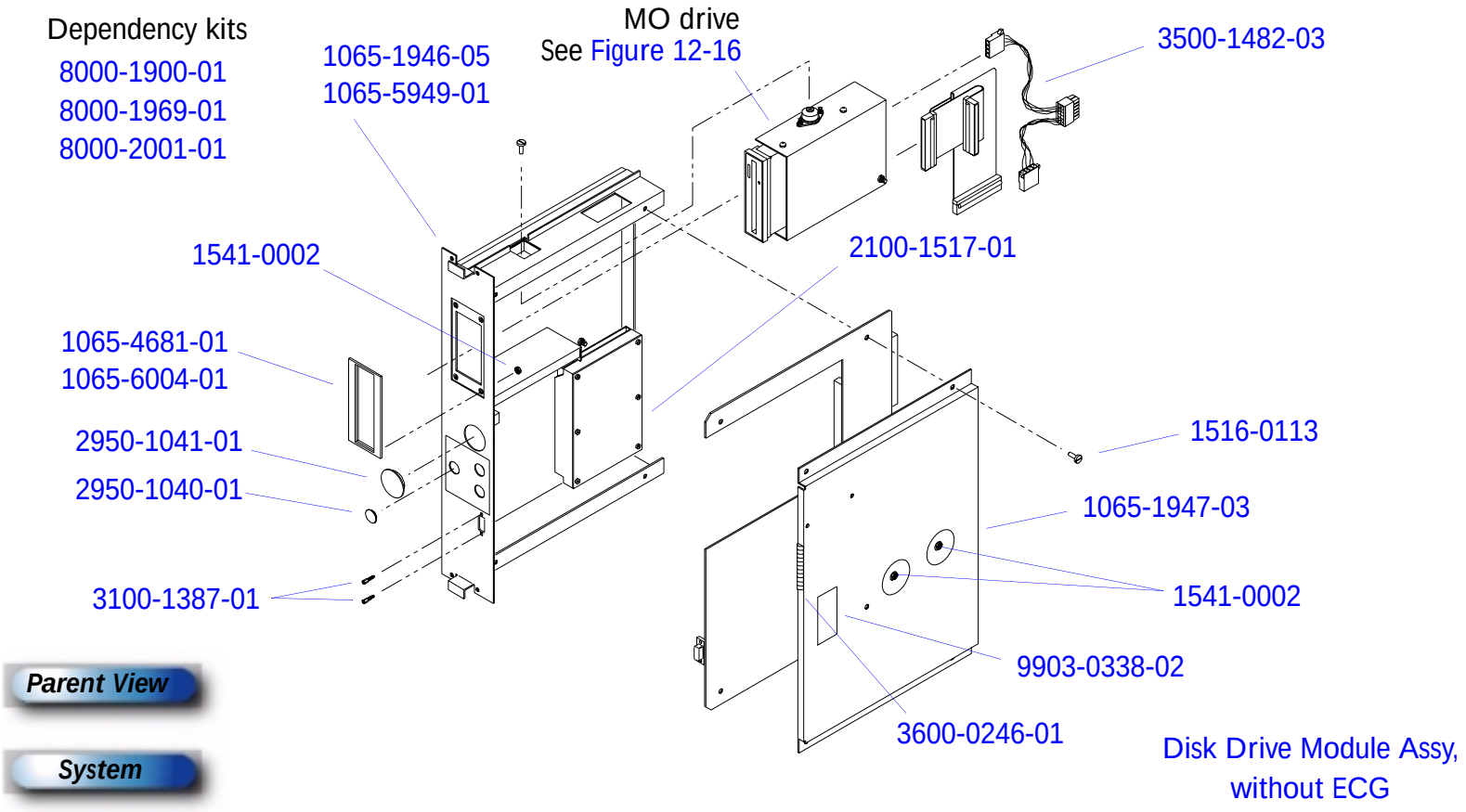


Figure 12-13 DDEA Module Assembly (Physio)

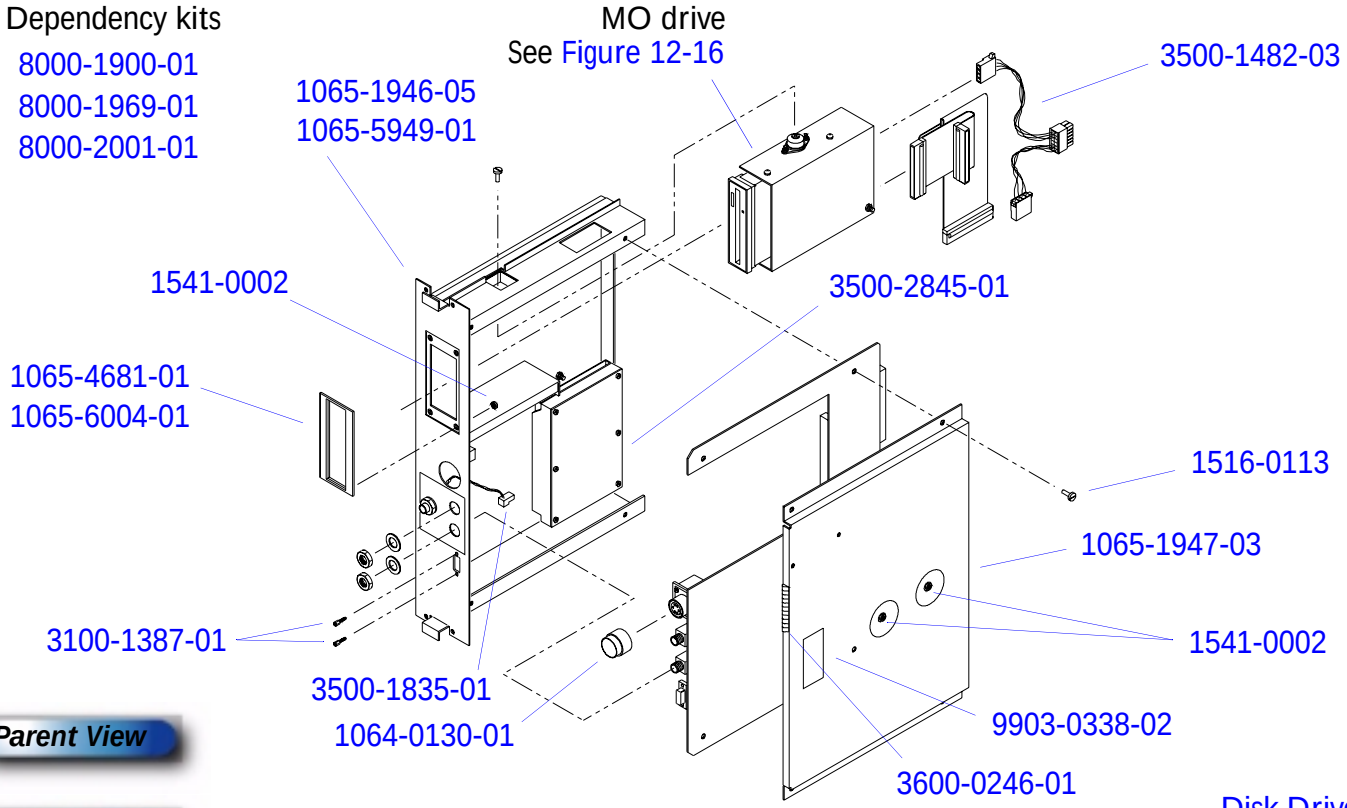


Figure 12-14 DDEA Module Assembly (Without MO Drive)

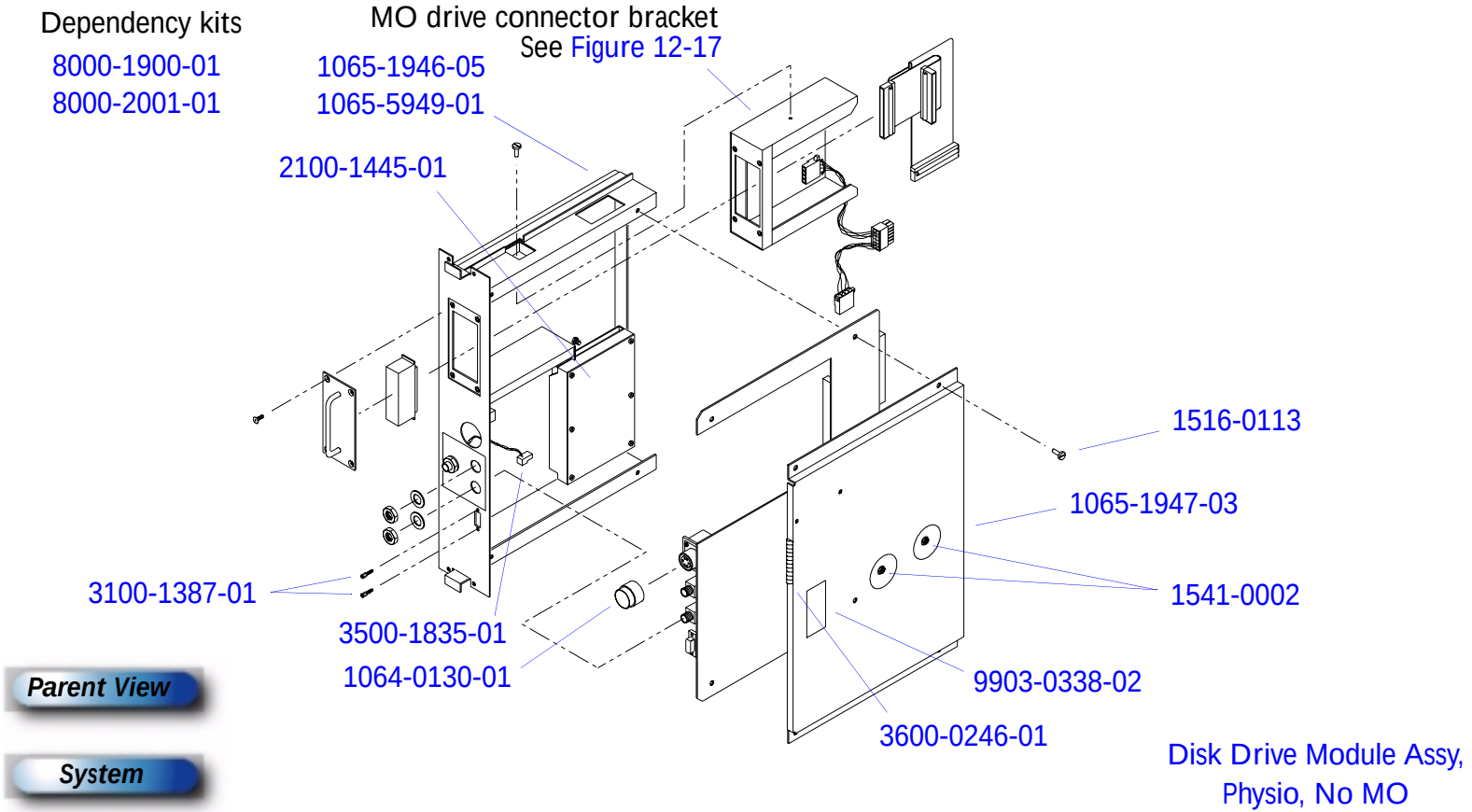
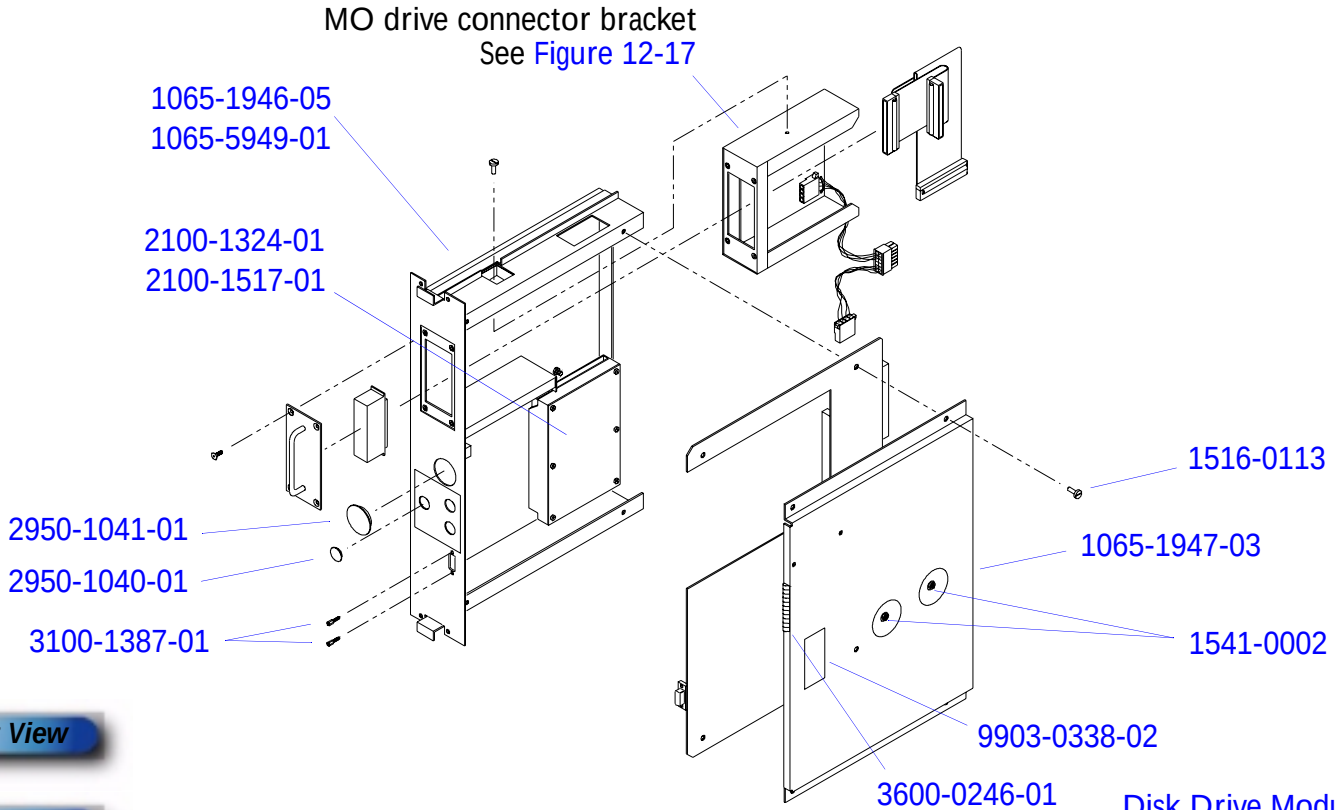
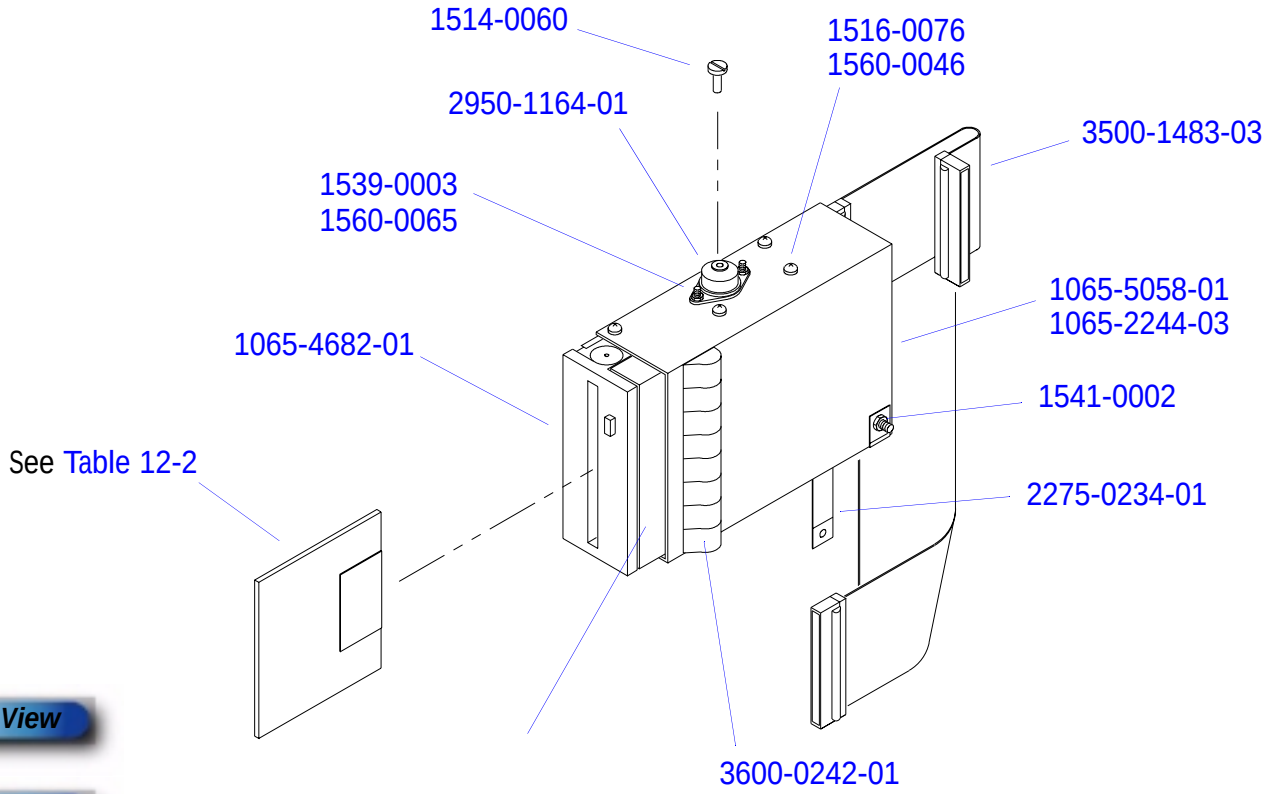


Figure 12-15 DDEA Module Assembly (Without ECG, MO Drive and Physio)



Parent View
System

Figure 12-16 MO Drive (DDEA Module)



Parent View

System

Figure 12-17 Non-MO Drive Connector Bracket (DDEA Module)

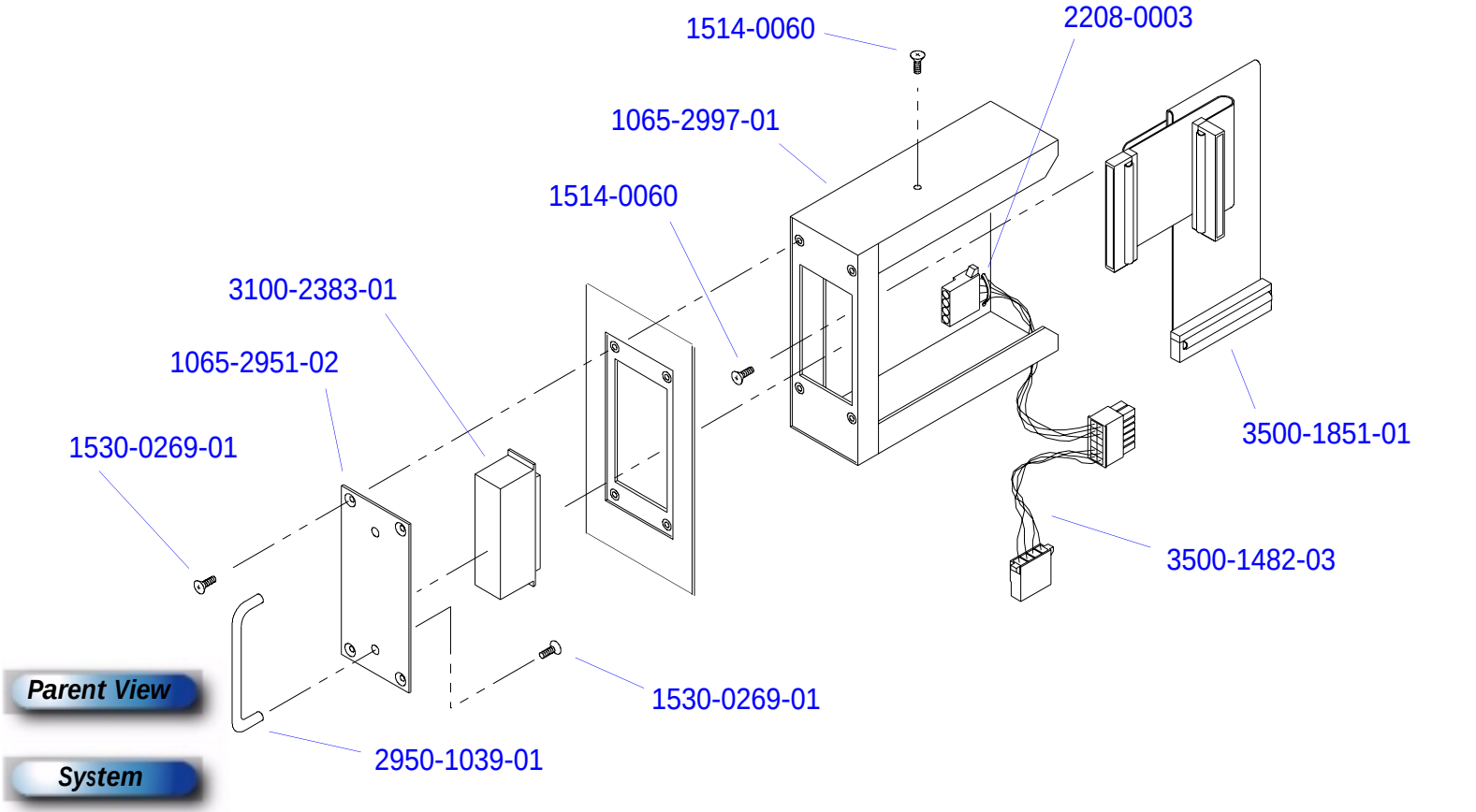
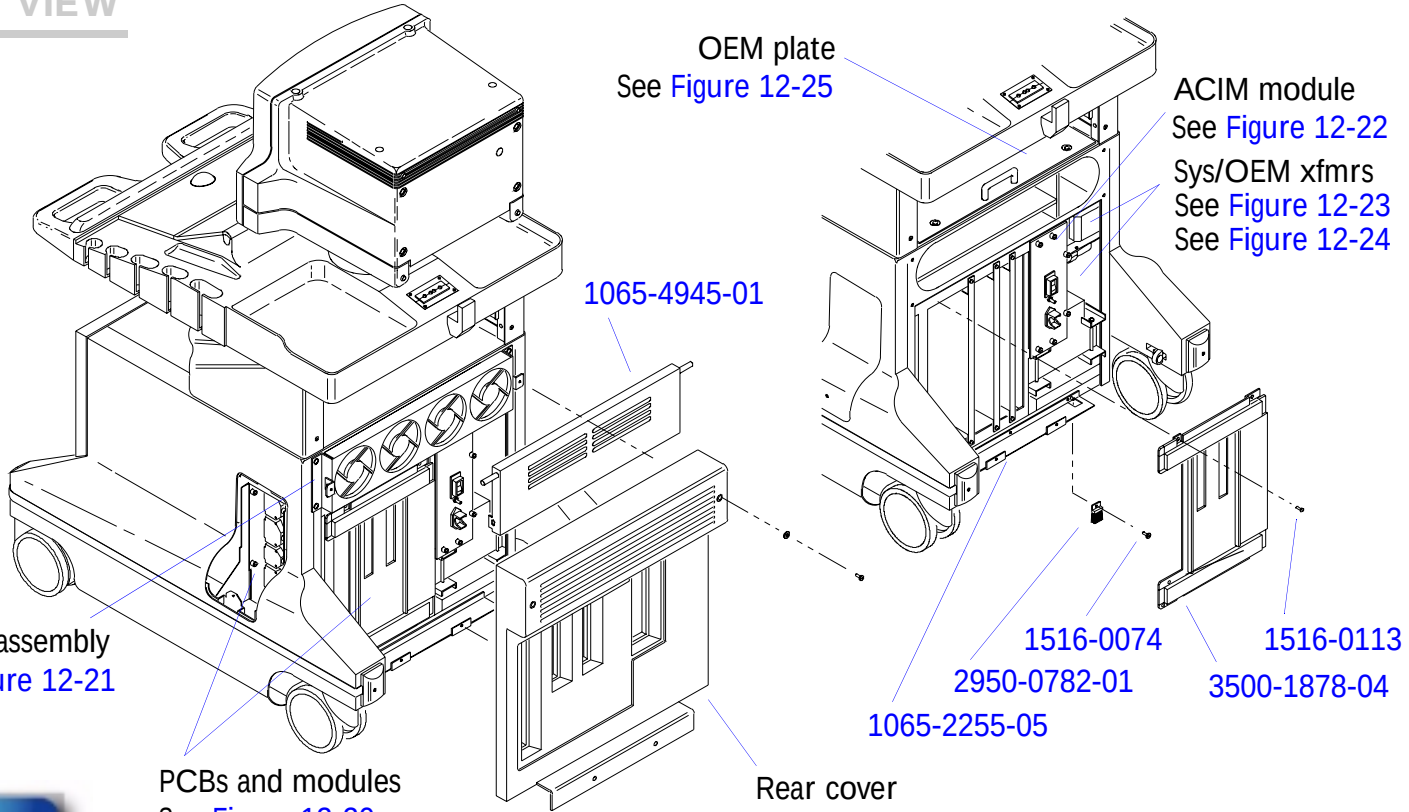


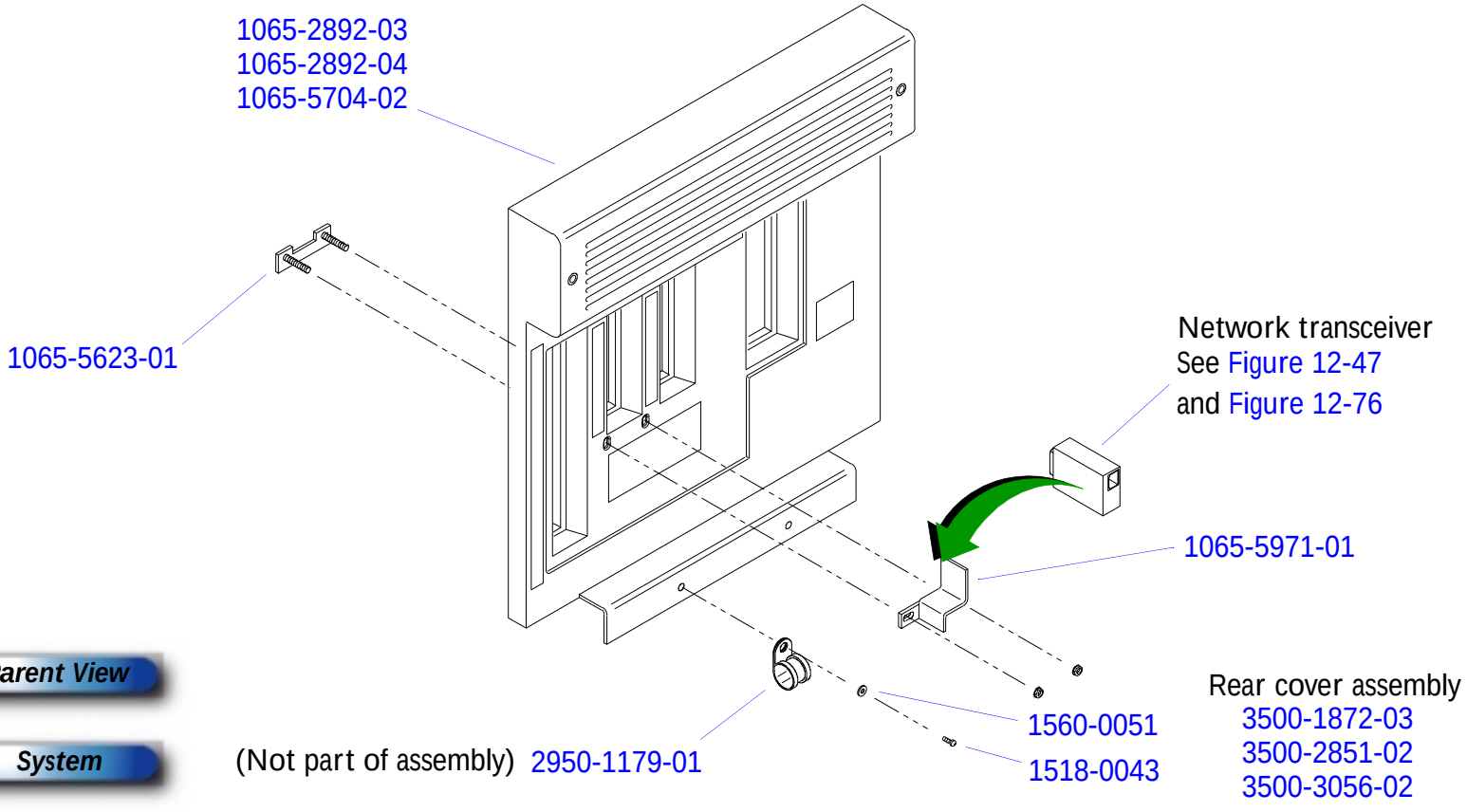
Figure 12-18 Rear Compartment

PARENT VIEW



System

Figure 12-19 Rear Cover Assembly



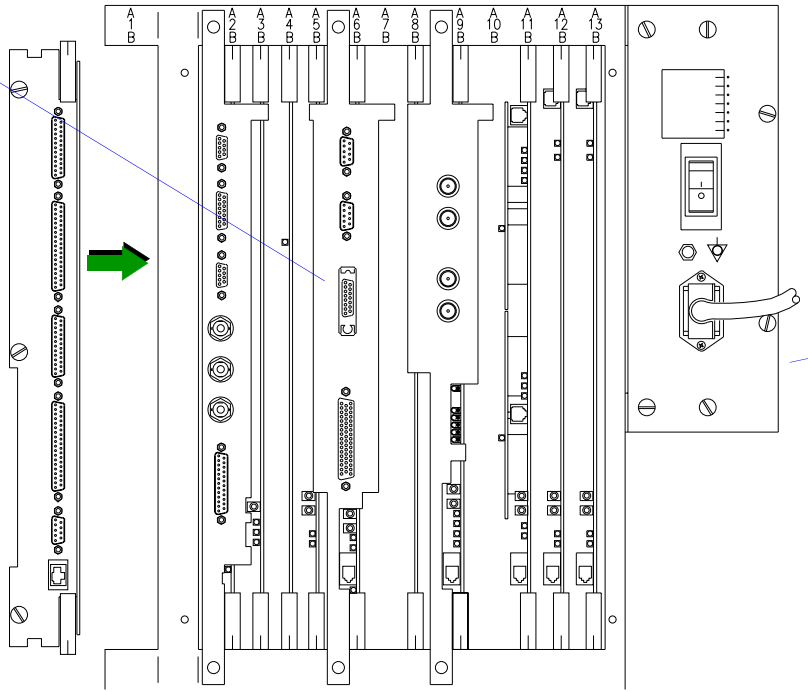
Parent View

System

Figure 12-20 PCBs and Modules (Rear Card Cage)

Networking transceiver
See Figure 10-4
See Figure 12-47

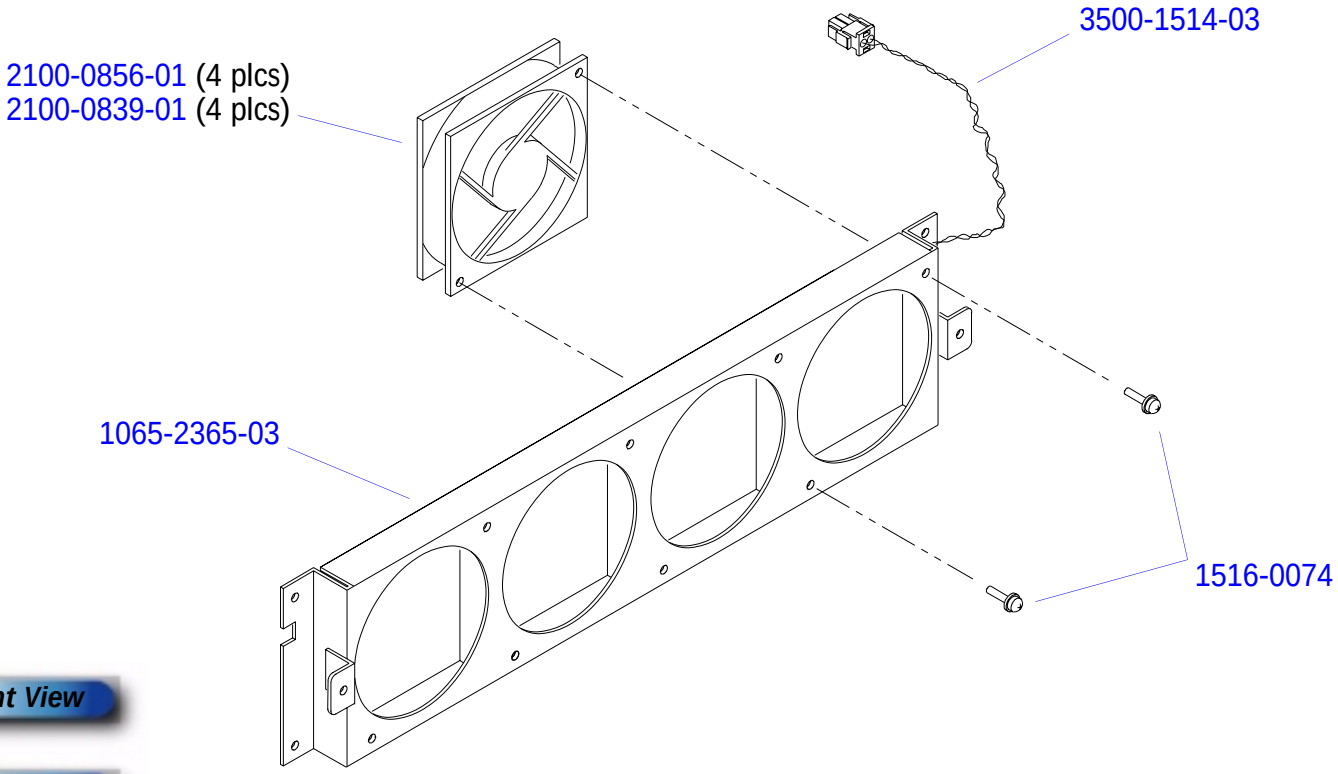
Call your Philips representative for the part number and compatible software version of system PCBs.



AC input module
See Figure 12-22

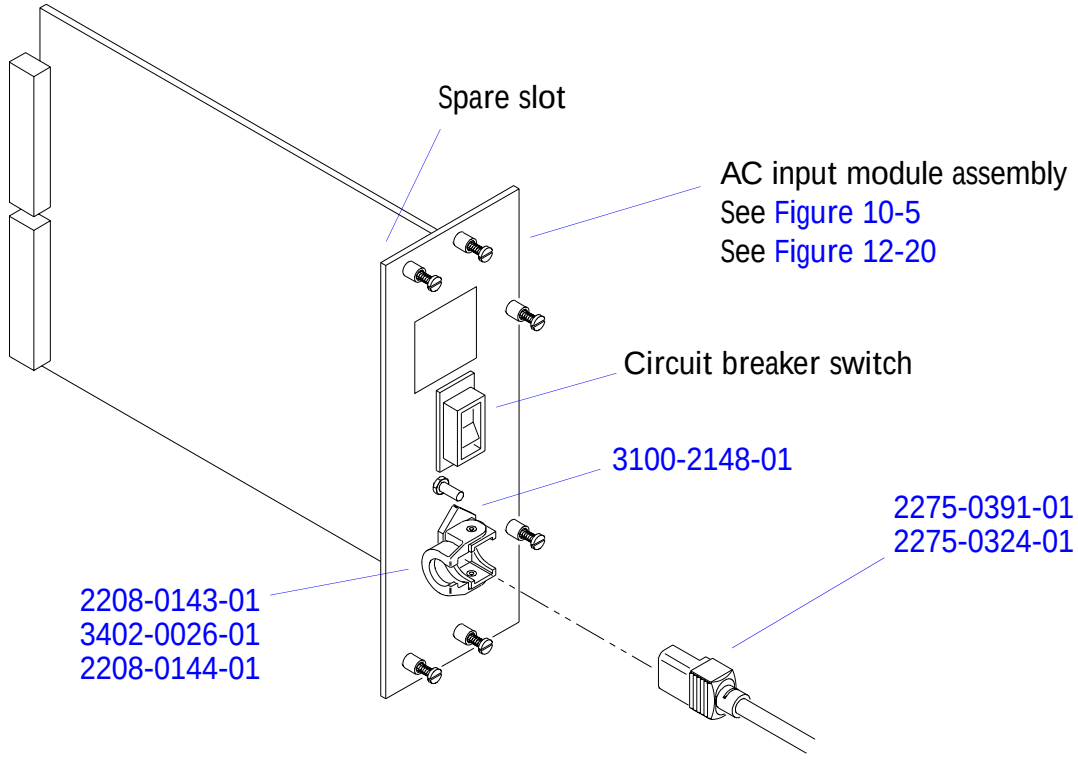
Parent View
System

Figure 12-21 24 Vdc Rear Fan Assembly



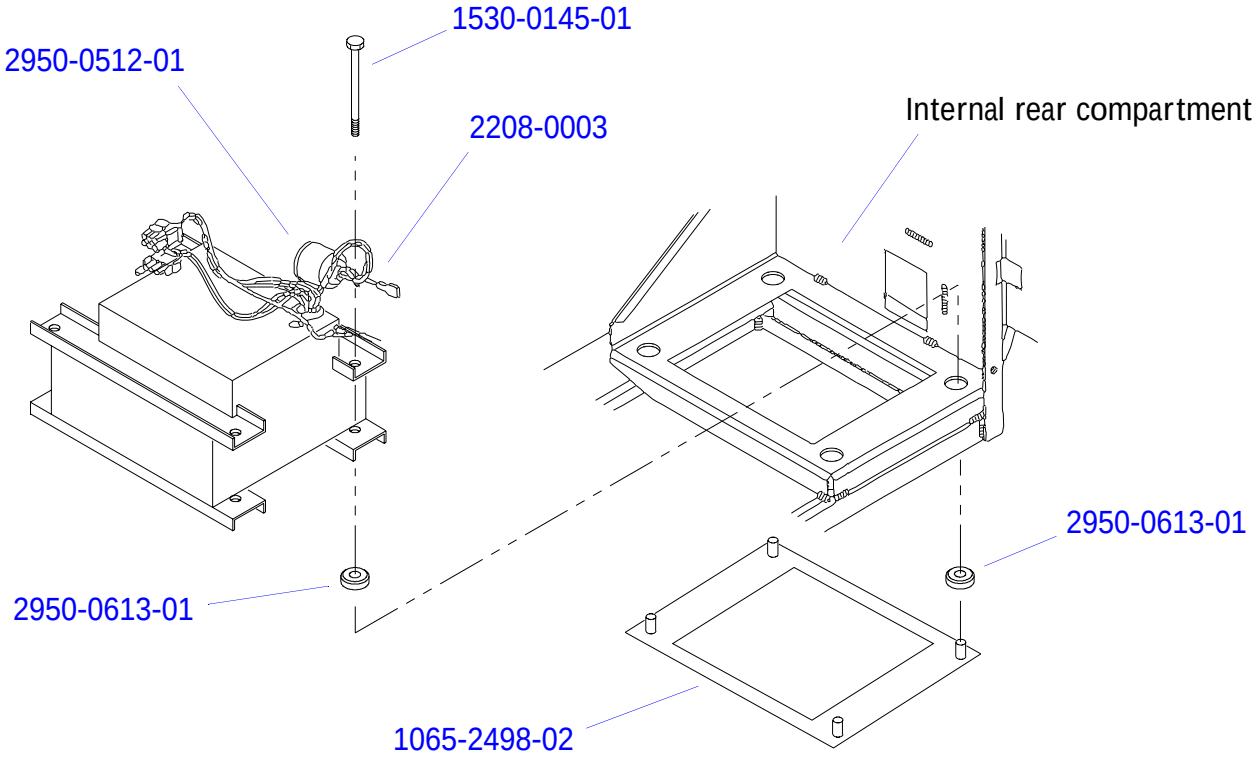
Parent View
System

Figure 12-22 AC Input Module (ACIM) PS4



Parent View
System

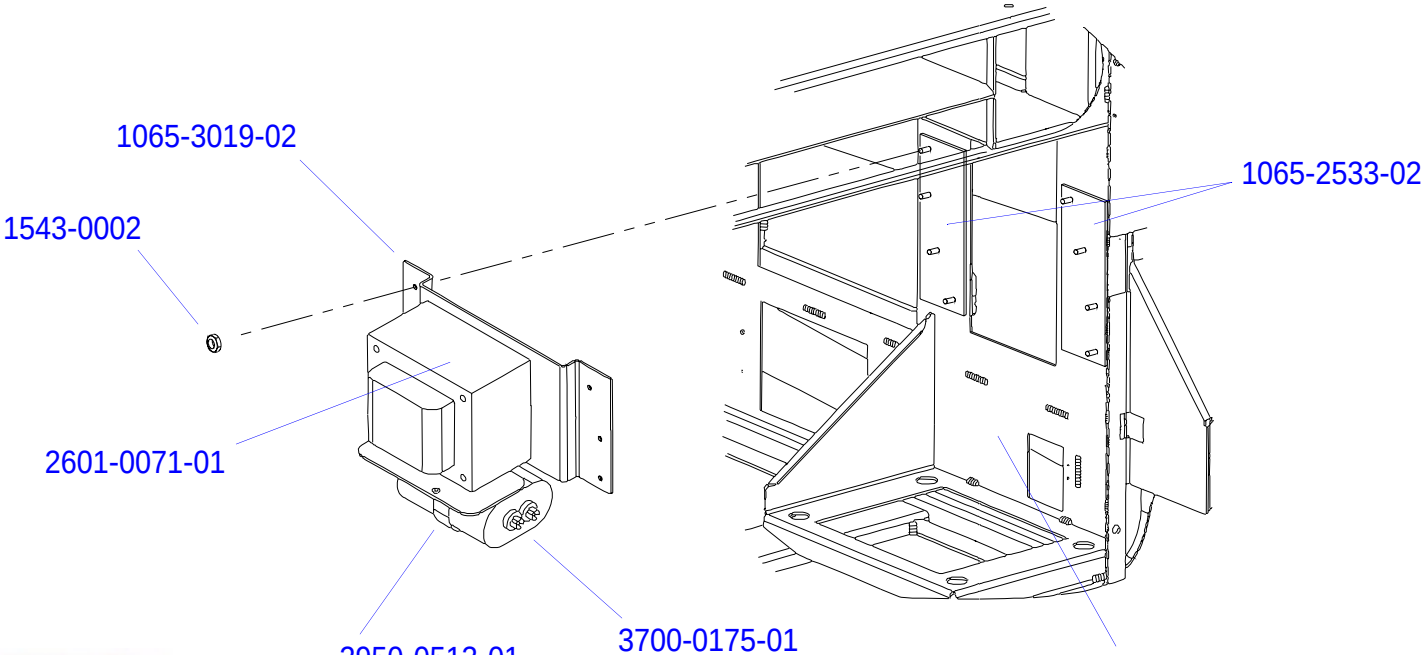
Figure 12-23 System Power Transformer



System power transformer assembly
2601-0052-06

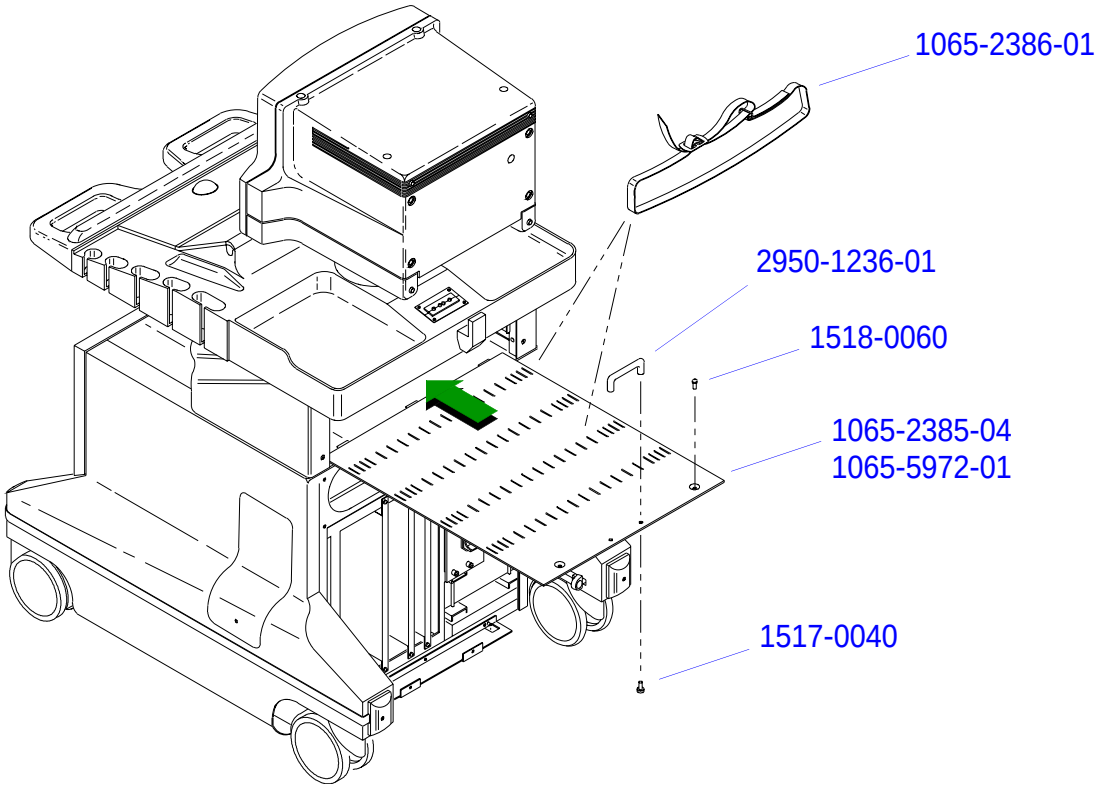
Parent View
System

Figure 12-24 OEM Power Transformer



Parent View
System

Figure 12-25 Universal OEM Plate

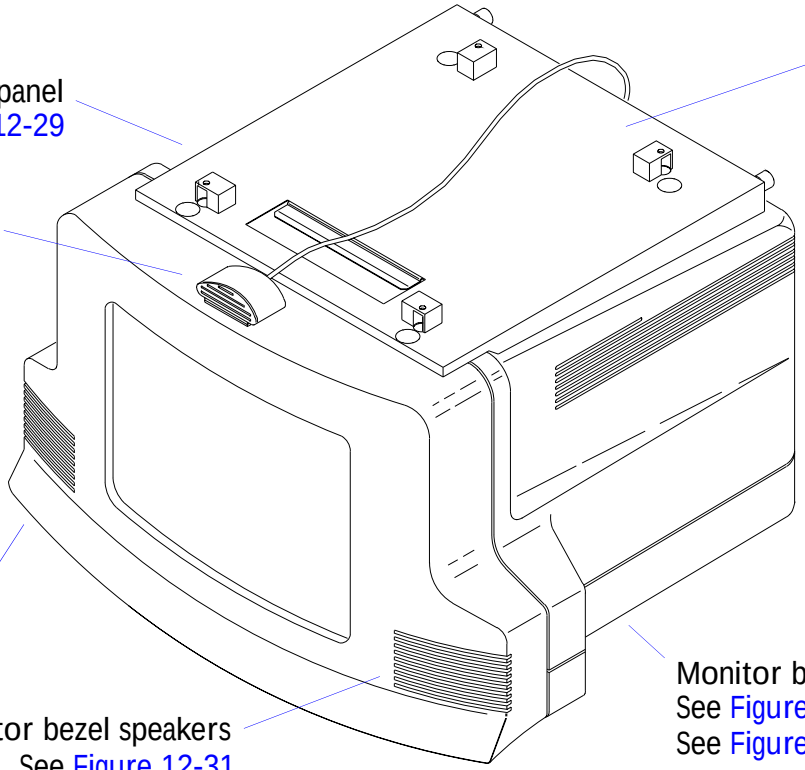


Parent View

System

Figure 12-26 Video Monitor Assembly

PARENT VIEW



Monitor control panel
See Figure 12-29

Monitor microphone
See Figure 12-35

Monitor bezel light bar
See Figure 12-30

Monitor bezel speakers
See Figure 12-31

VCR support
See Figure 12-34

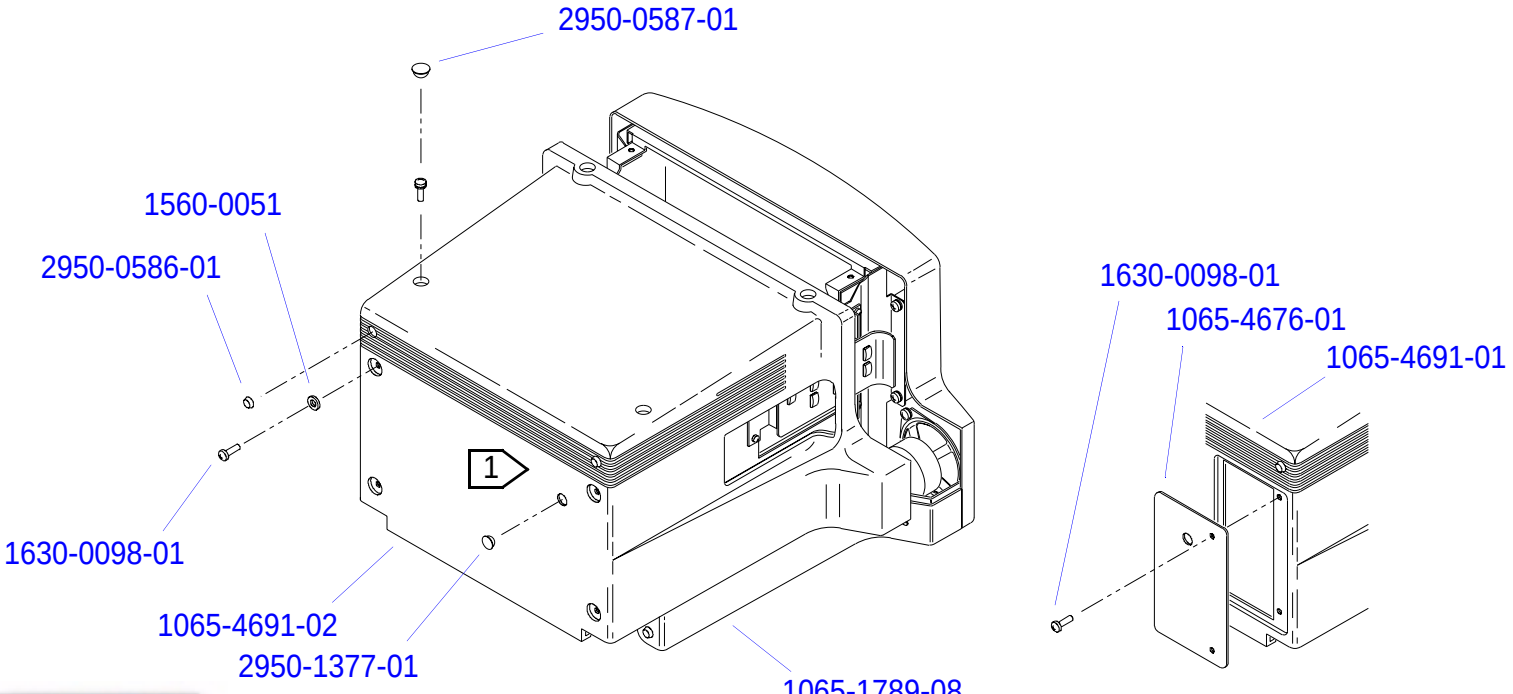
Monitor cover
See Figure 12-27

Monitor chassis
See Figure 12-28

Monitor base
See Figure 12-32
See Figure 12-33

Video monitor assembly
3500-2532-11
1561-0032
3500-2971-01
3500-3040-05/04
3500-3040-07/06

Figure 12-27 Video Monitor Cover

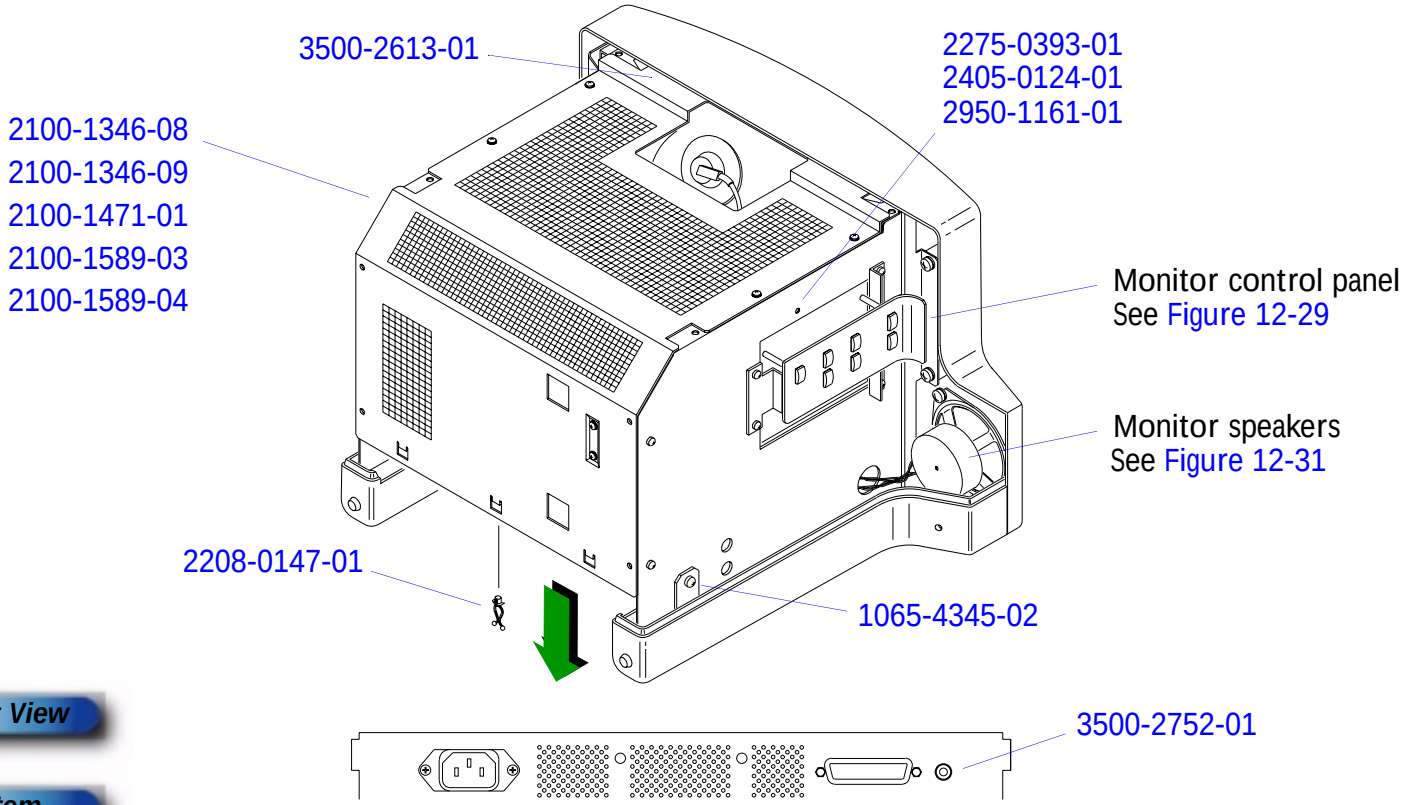


Parent View

System

1 See Figure 12-28 for FIMI monitor microphone jack location.

Figure 12-28 Video Monitor Chassis



FIMI monitor shown; Data Ray and Electrohome monitors are similar.

Parent View
System

Figure 12-29 Video Monitor Control Panel

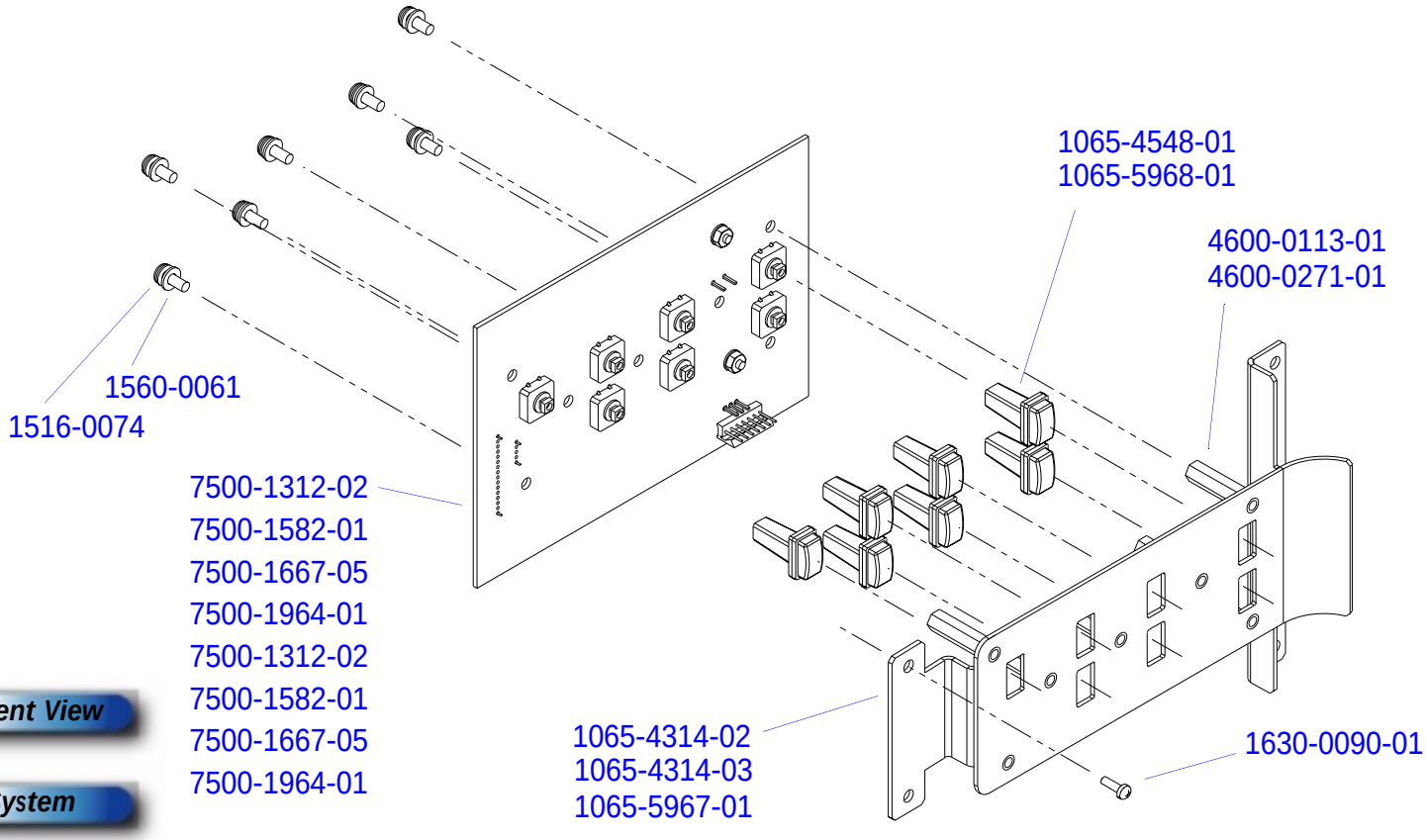
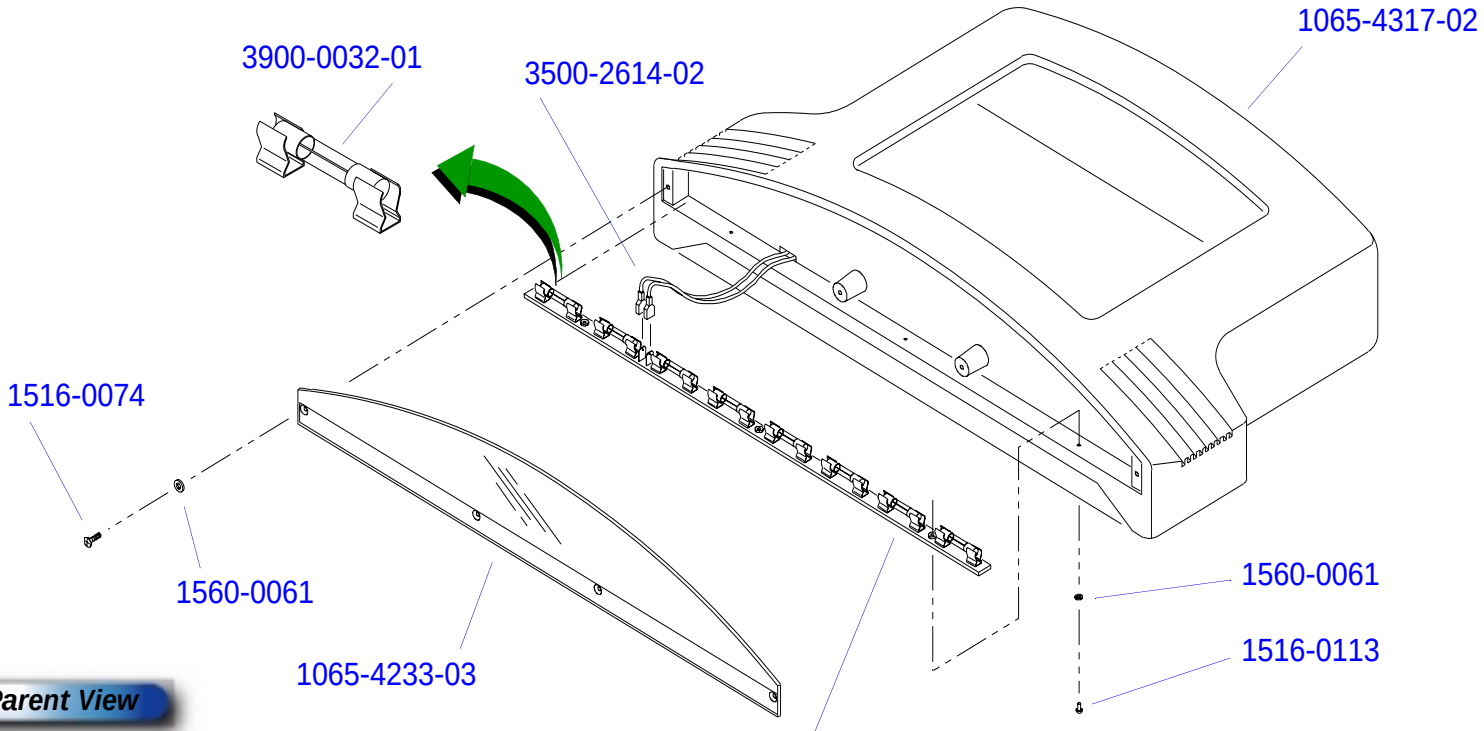


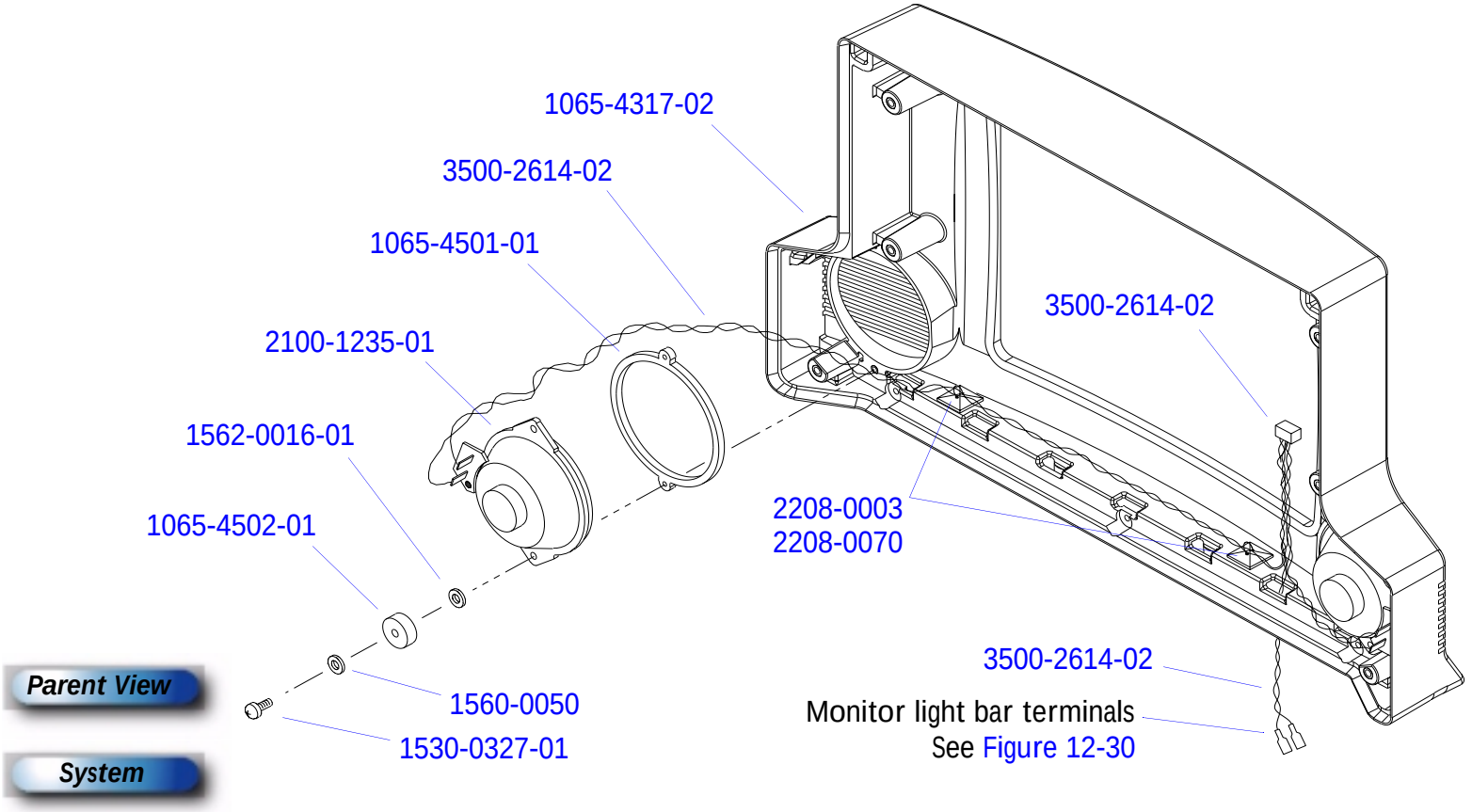
Figure 12-30 Video Monitor Bezel (Light Bar)



Parent View

System

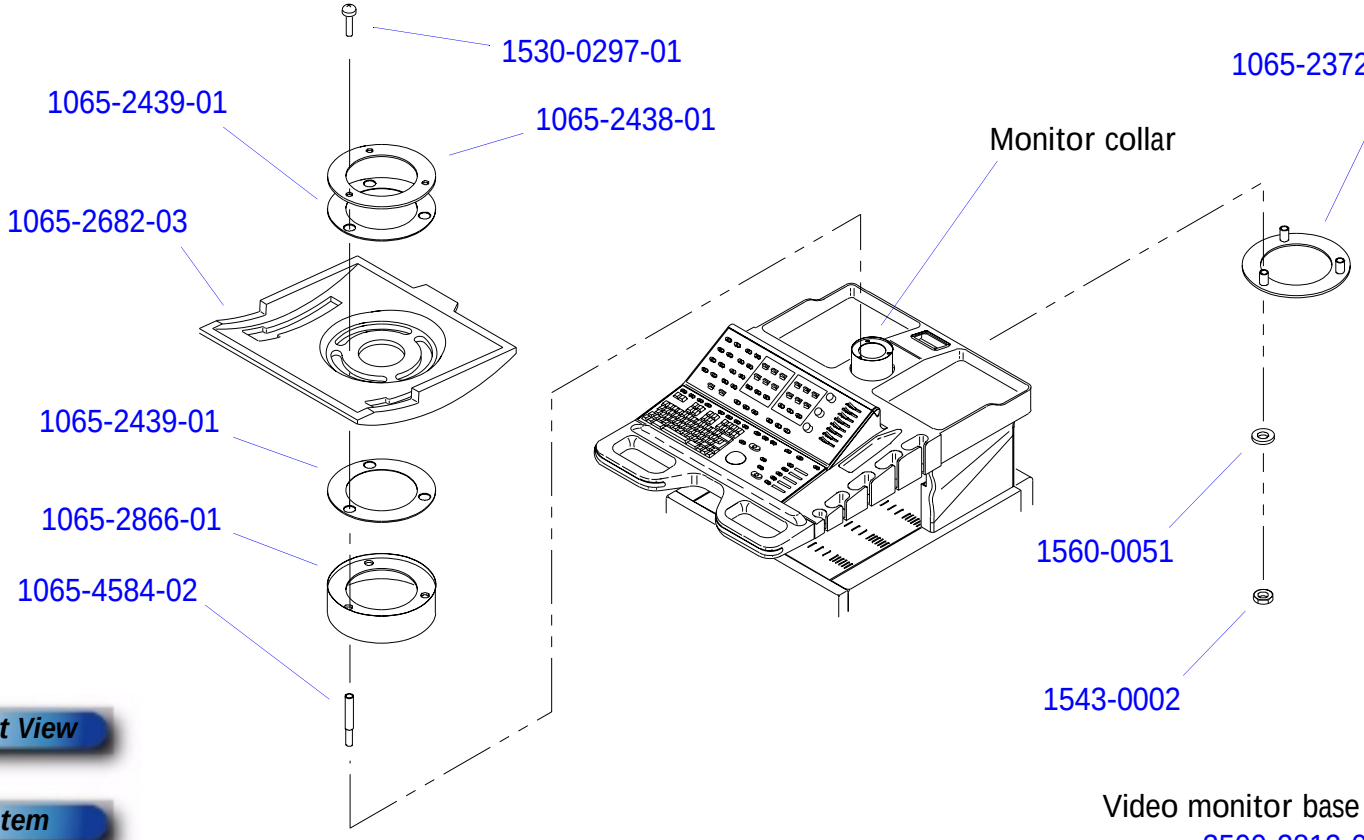
Figure 12-31 Video Monitor Bezel (Speakers)



Parent View

System

Figure 12-32 Video Monitor Base Assembly

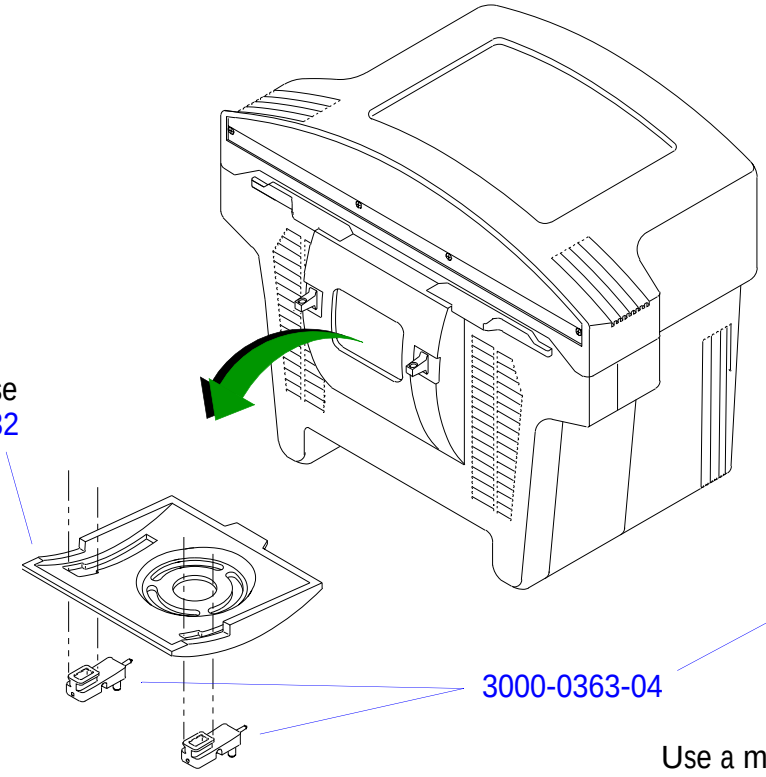


Parent View

System

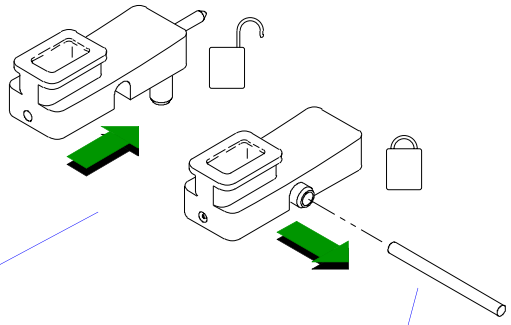
Video monitor base assembly
3500-2812-03

Figure 12-33 Video Monitor Base Lock



CAUTION

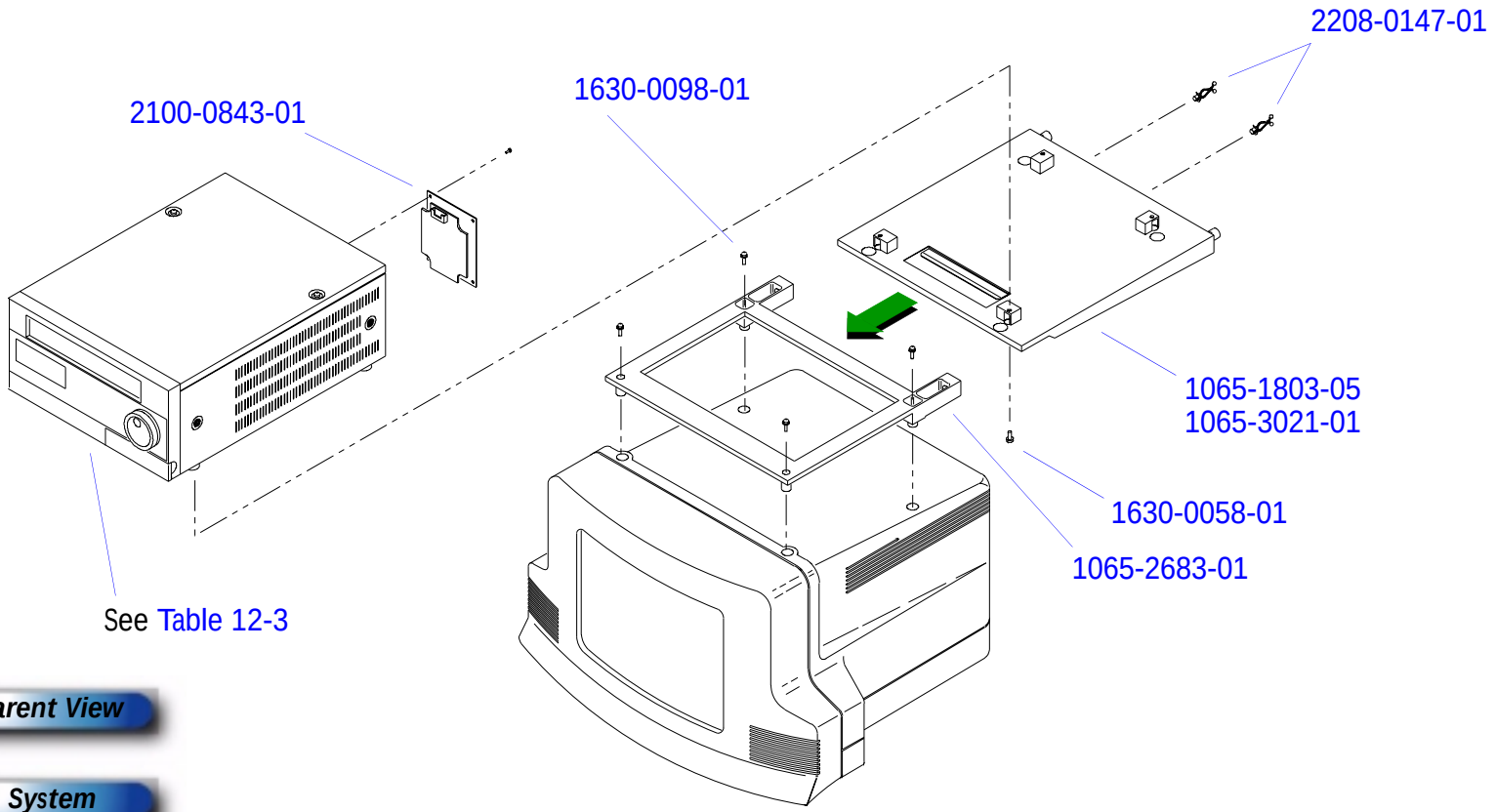
To prevent damage to the monitor, the latch must be in the locked position on both sides of the monitor base before moving the system.



Use a metal rod or a screwdriver to rotate the latch handle to lock or unlock the latch.

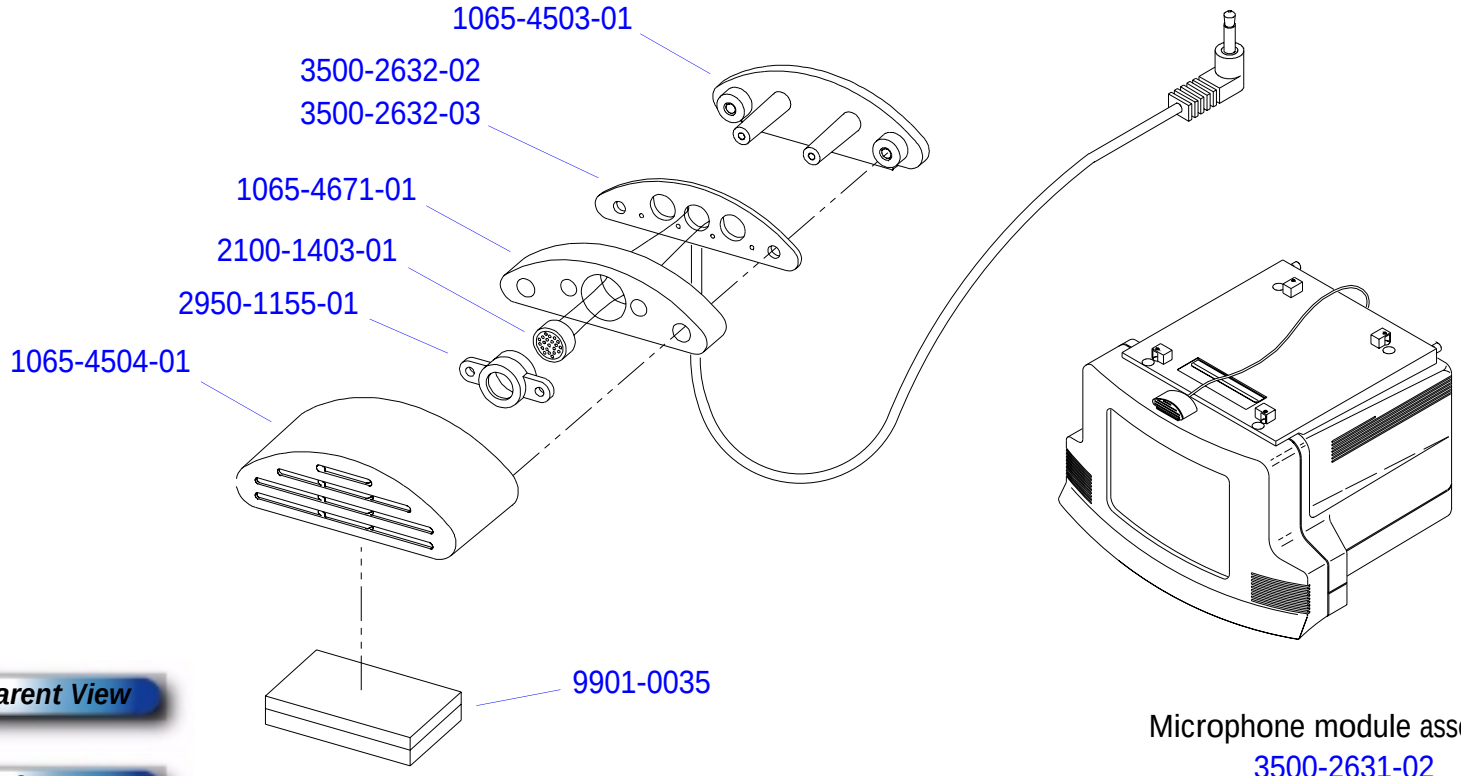
Parent View
System

Figure 12-34 Video Monitor VCR Support



Parent View
System

Figure 12-35 Microphone Module Assembly (Turtle)



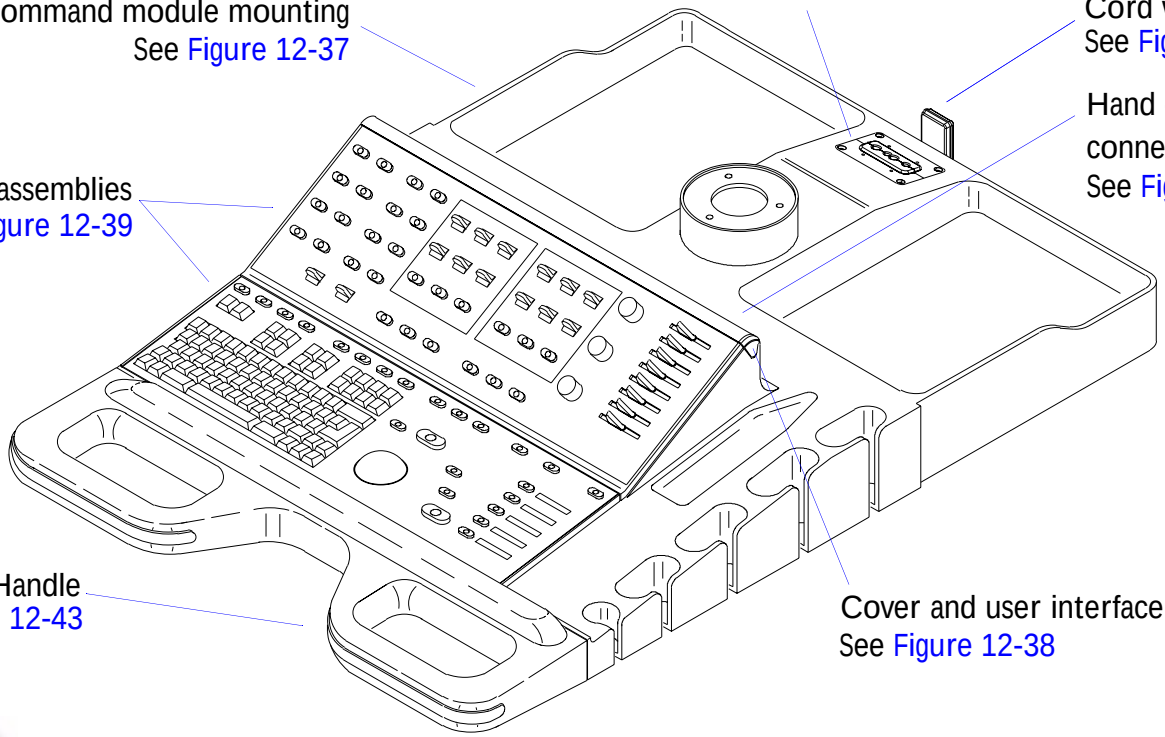
Parent View

System

Microphone module assembly
3500-2631-02
3500-2631-03

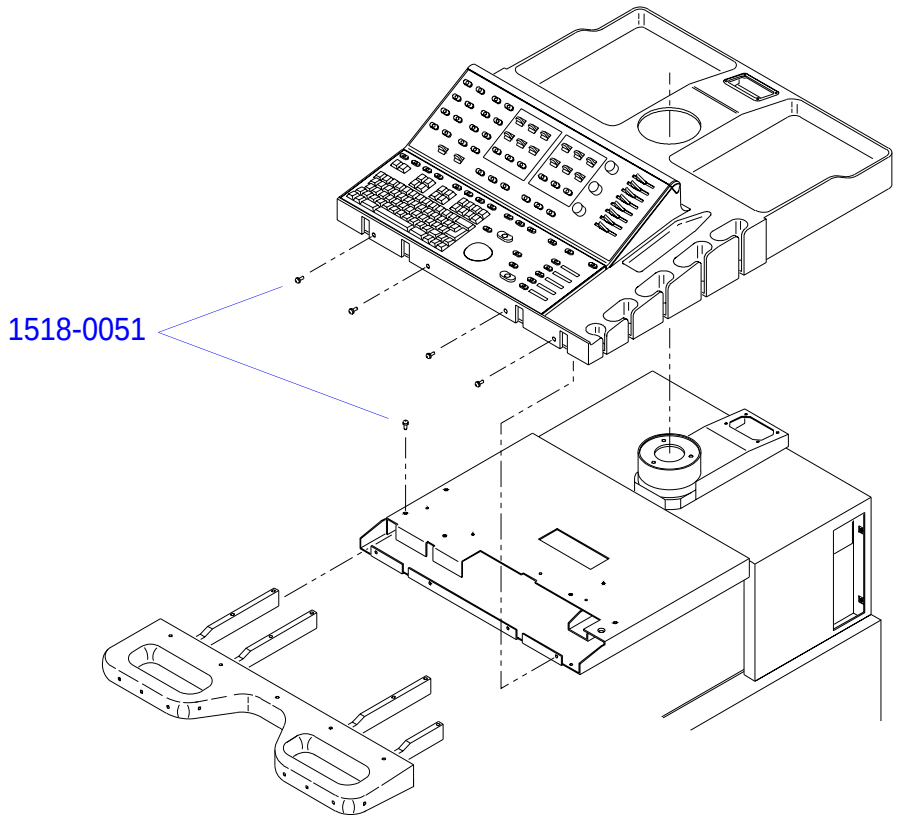
Figure 12-36 Command Module

PARENT VIEW



System

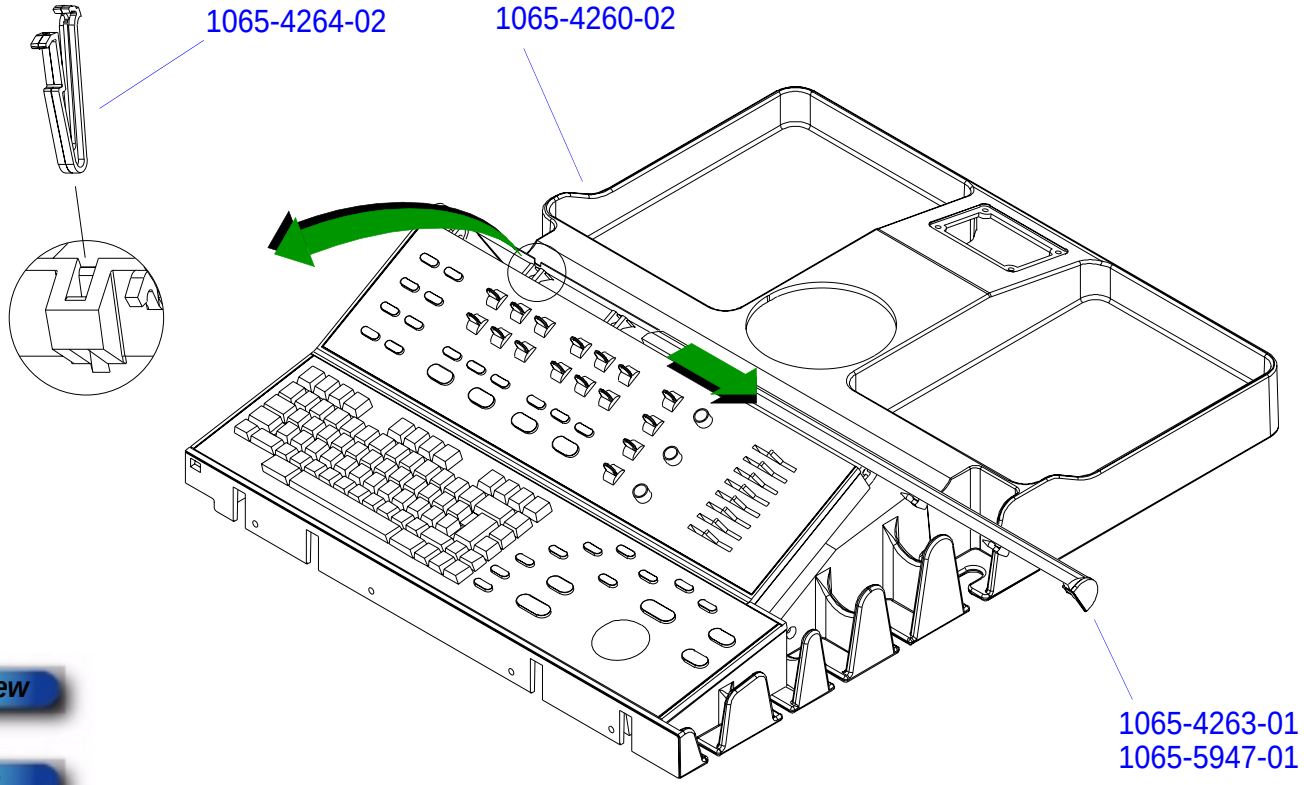
Figure 12-37 Command Module Mounting



Parent View

System

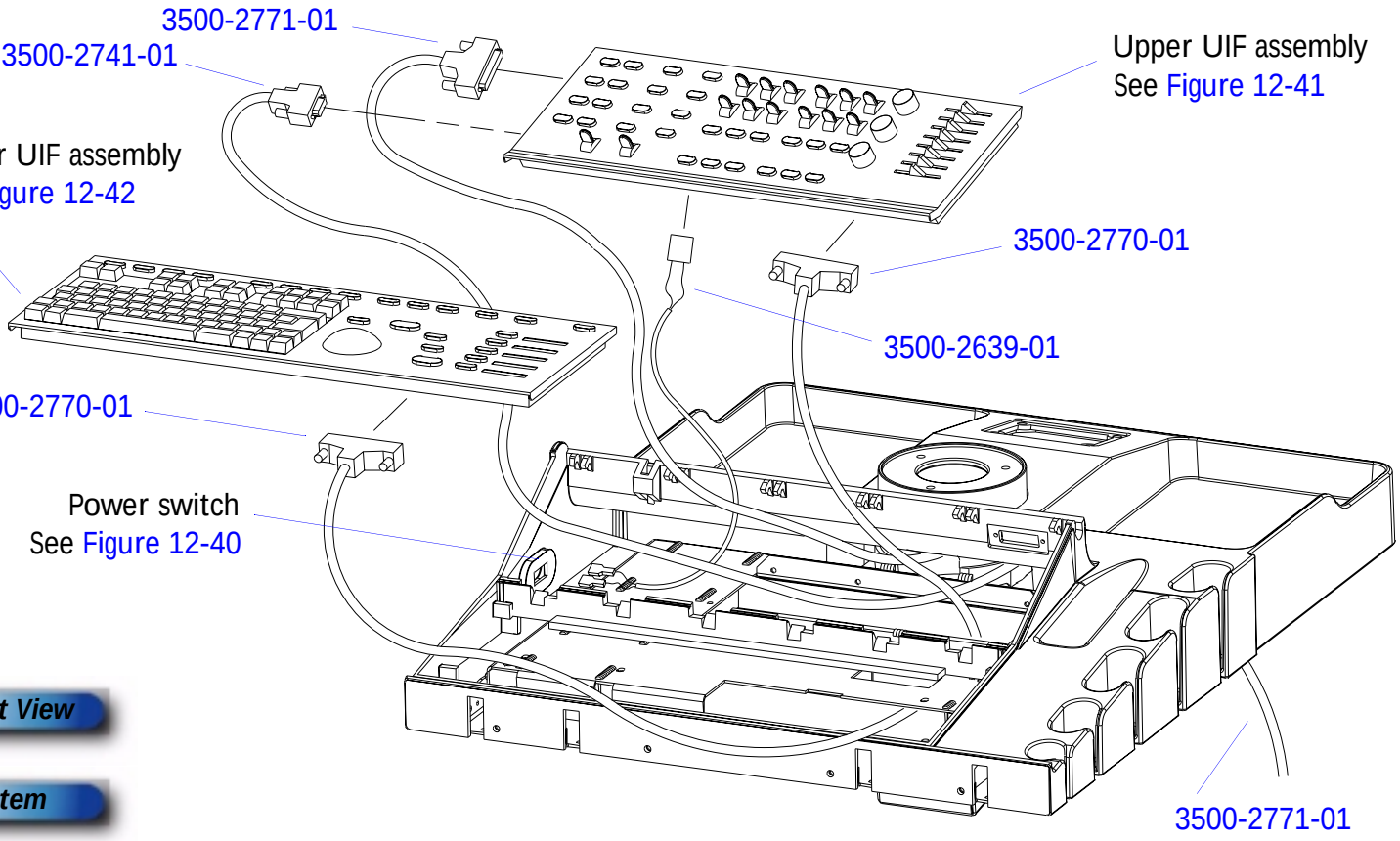
Figure 12-38 Cover and User Interface Lock Bar



Parent View

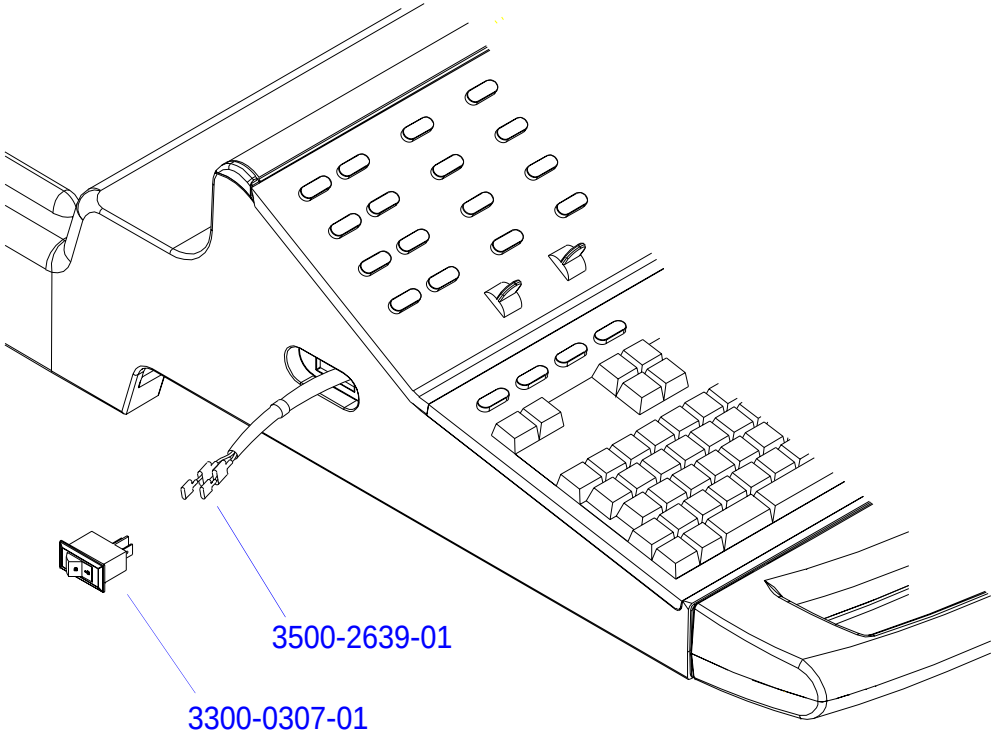
System

Figure 12-39 User Interface (Control Panel) Assemblies



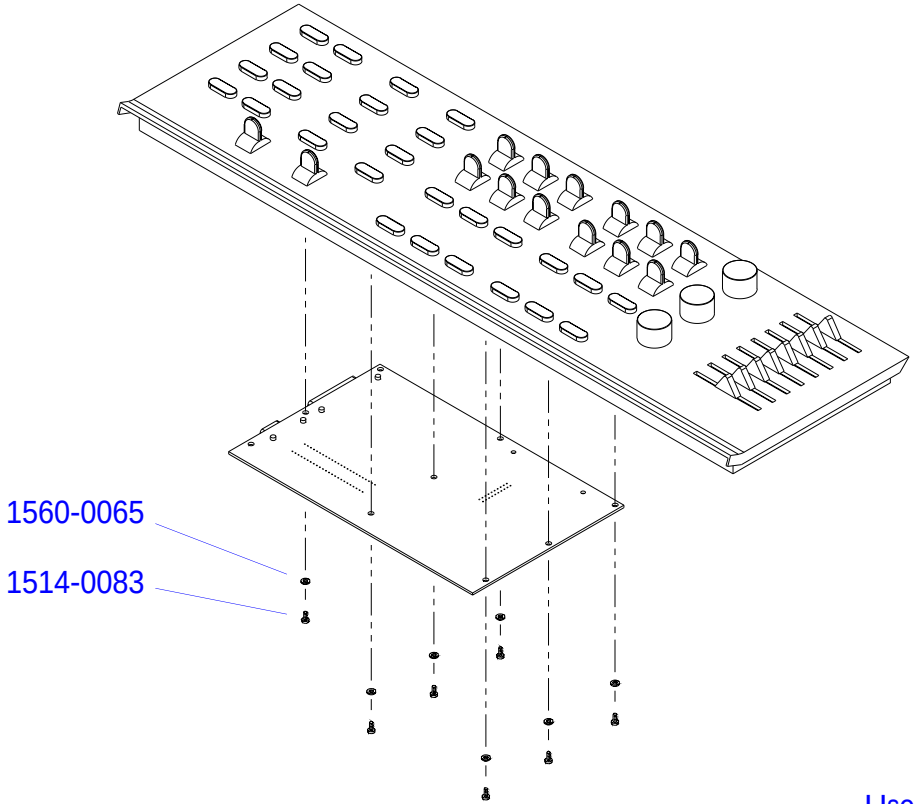
Parent View
System

Figure 12-40 Power Switch



Parent View
System

Figure 12-41 Upper User Interface Assembly

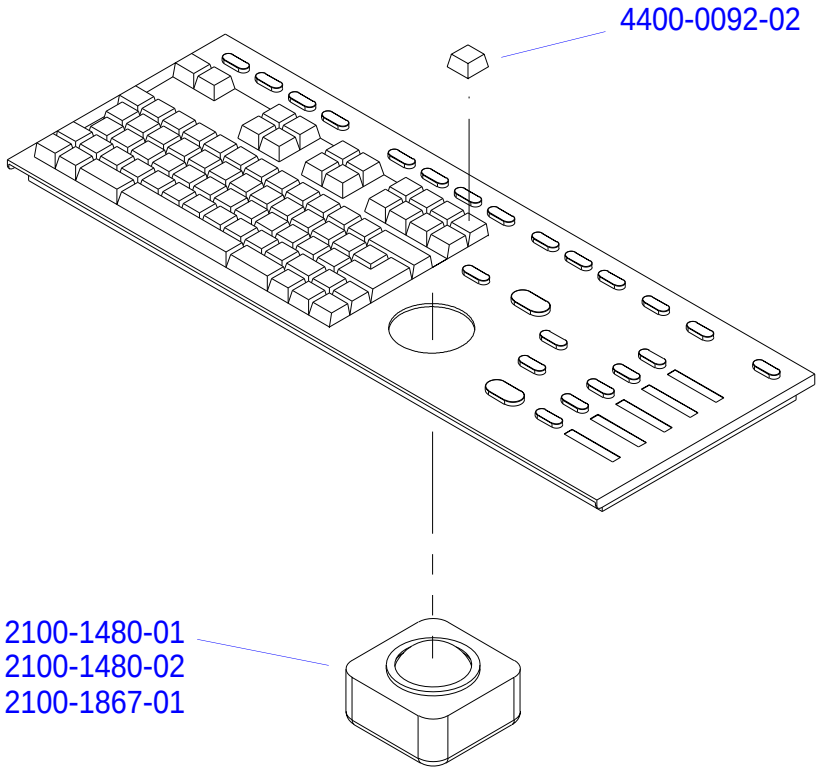


Parent View

System

User Interface Assy, Upper (UCP)

Figure 12-42 Lower User Interface Assembly

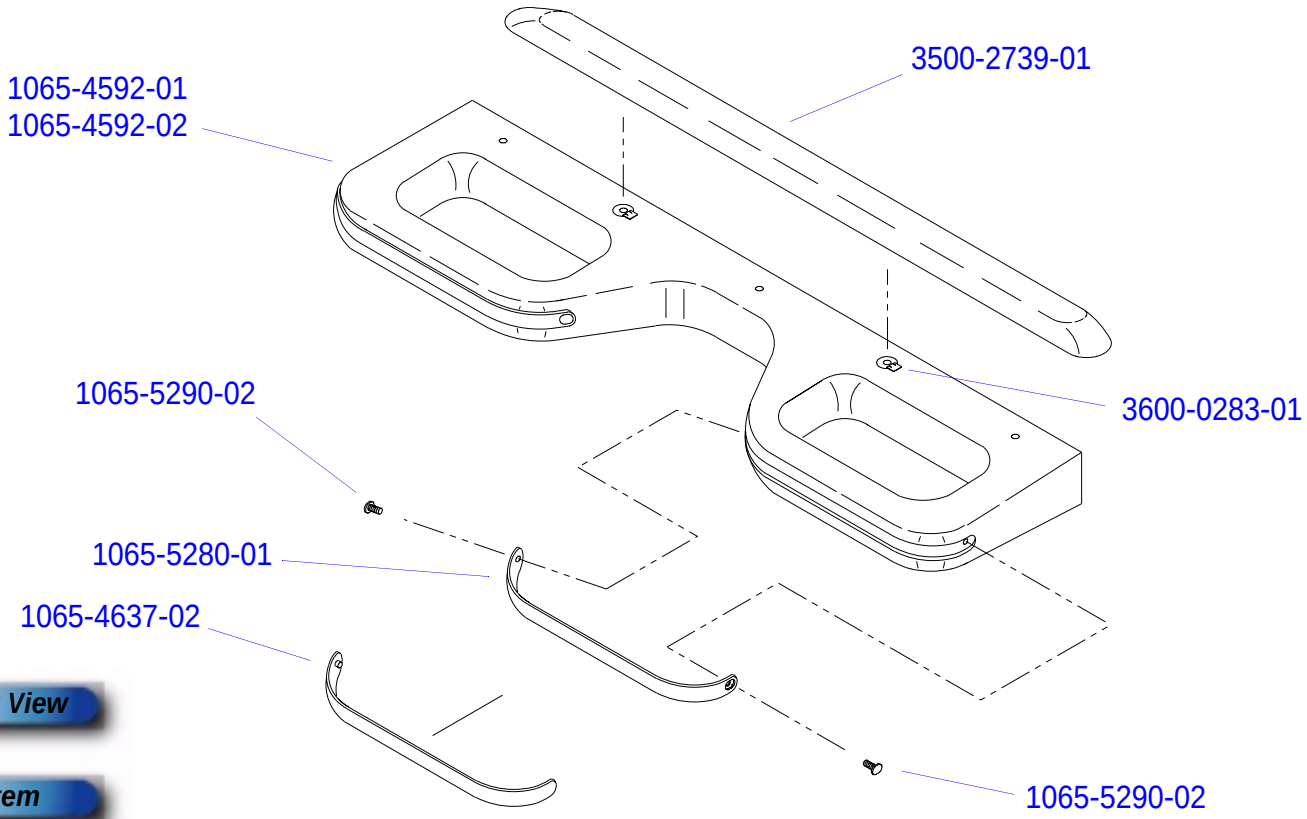


Parent View

System

User Interface Assy, Lower (LCP)

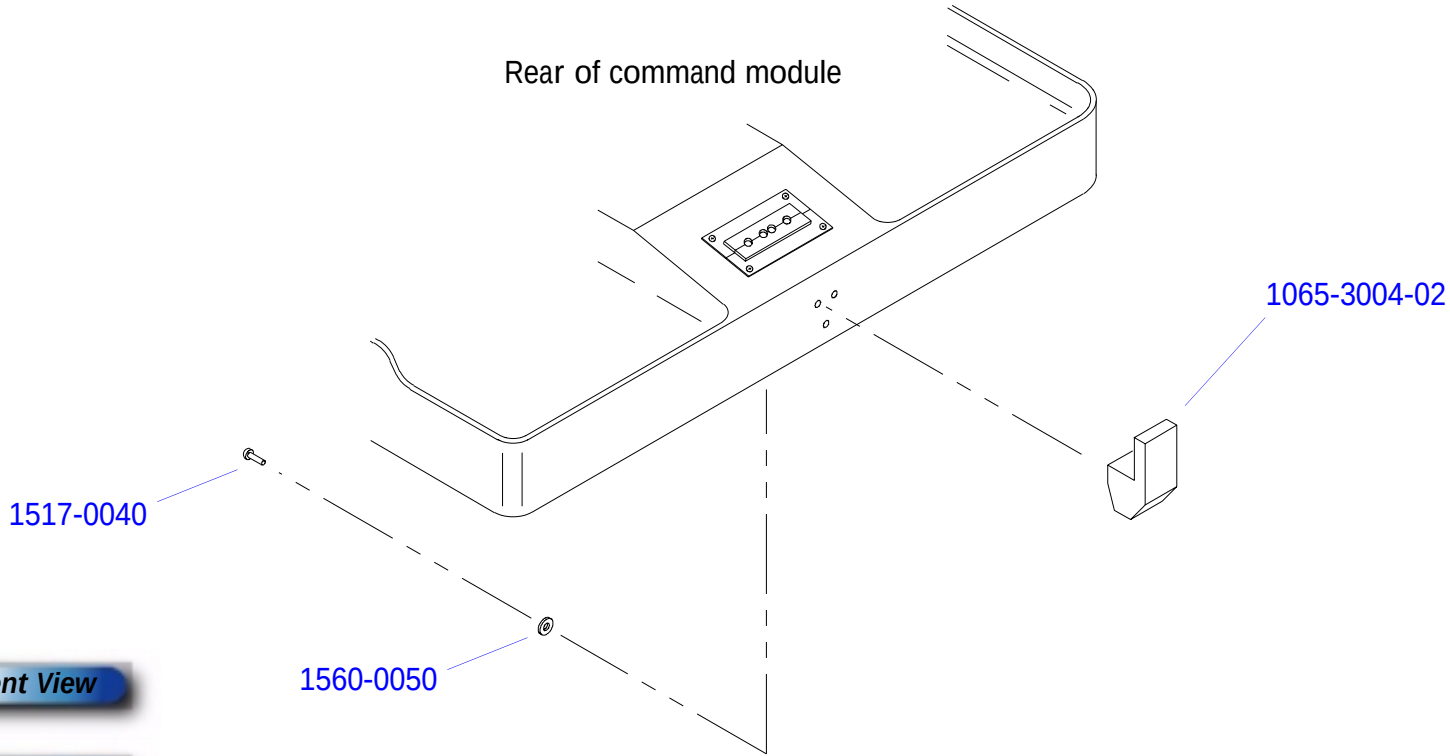
Figure 12-43 Handle Casting and Bumpers



Parent View

System

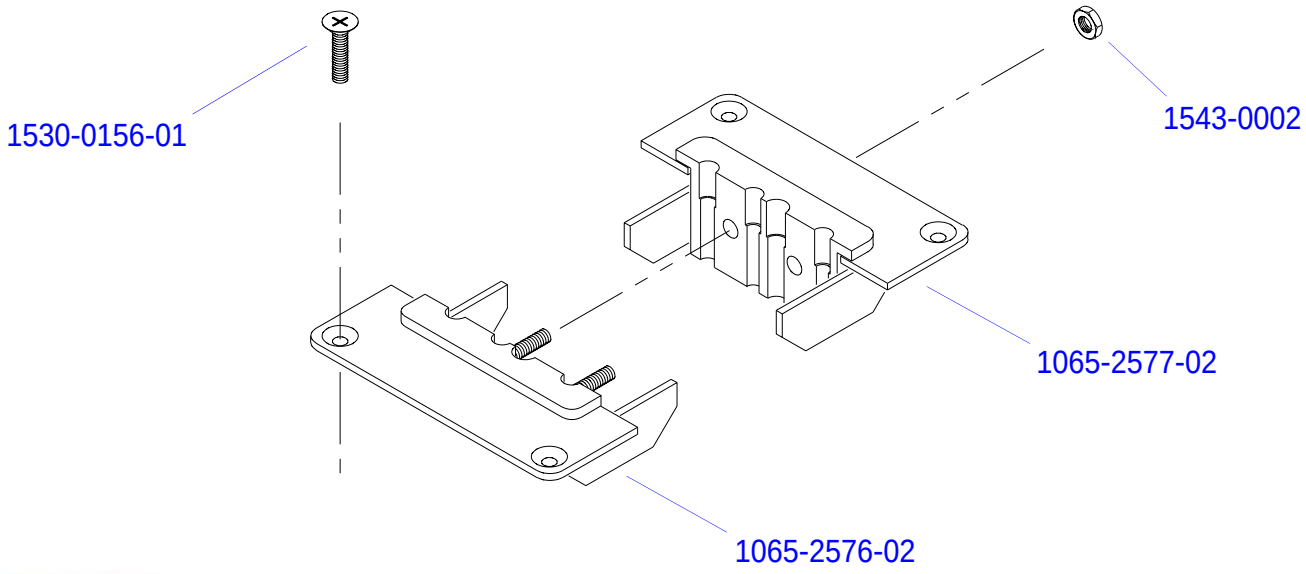
Figure 12-44 Cord Wrap



Parent View

System

Figure 12-45 Cable Clamp Assembly

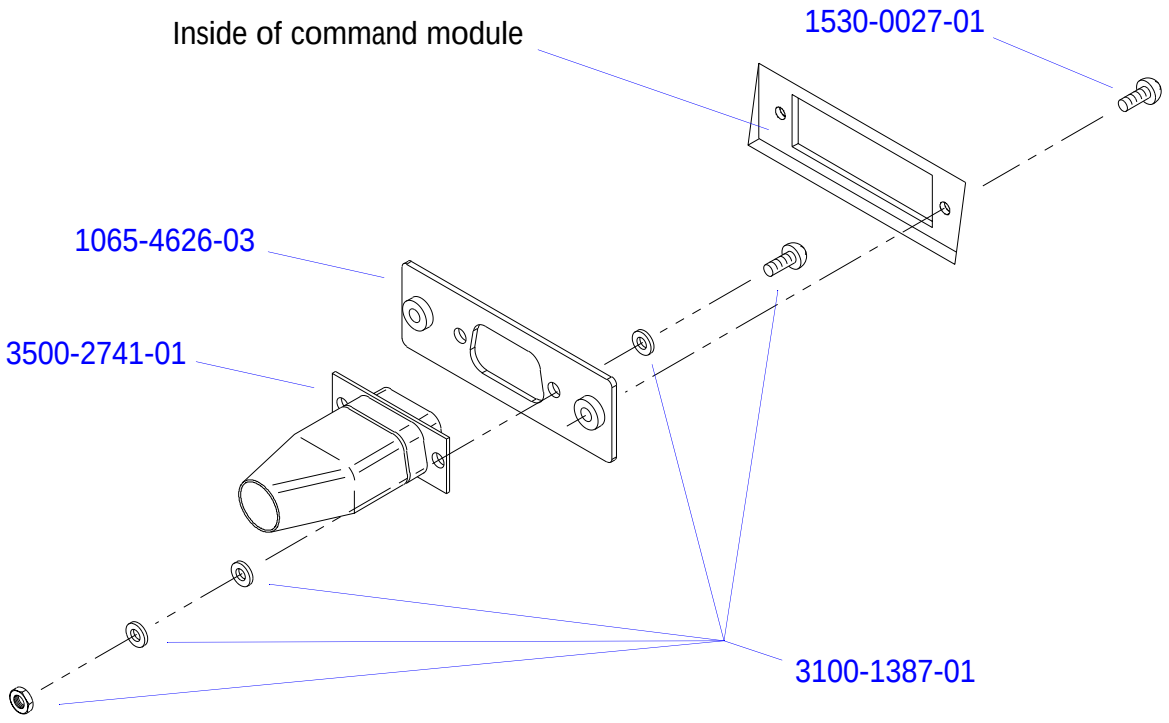


Parent View

System

Cable clamp assembly
3500-2721-02

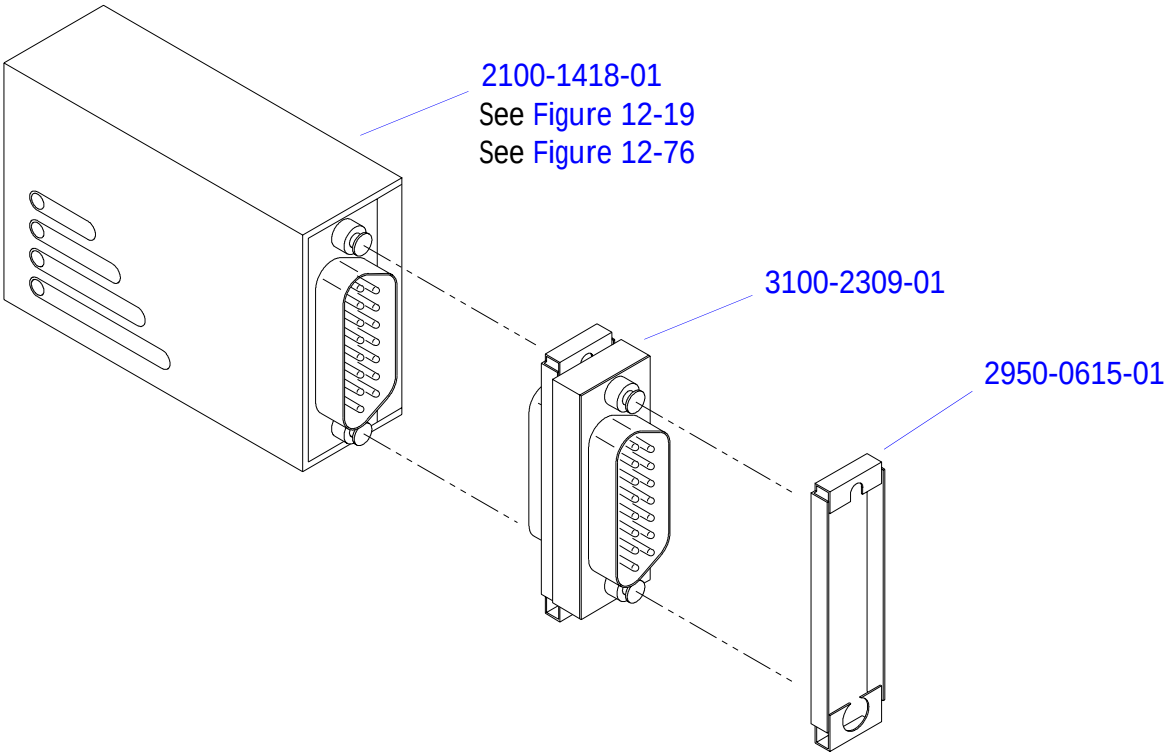
Figure 12-46 Hand Controller (Remote Control) Connector



Parent View

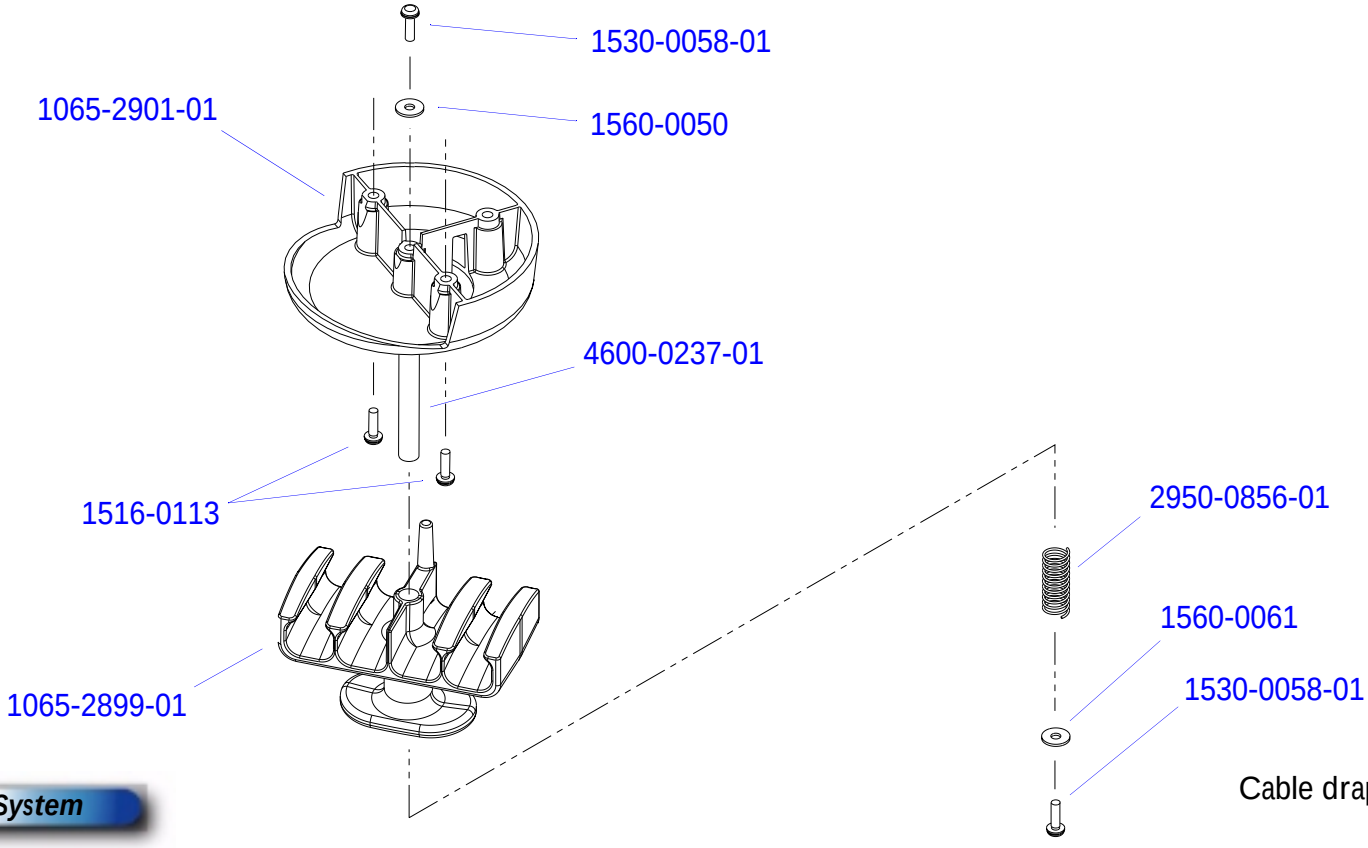
System

Figure 12-47 Networking Transceiver



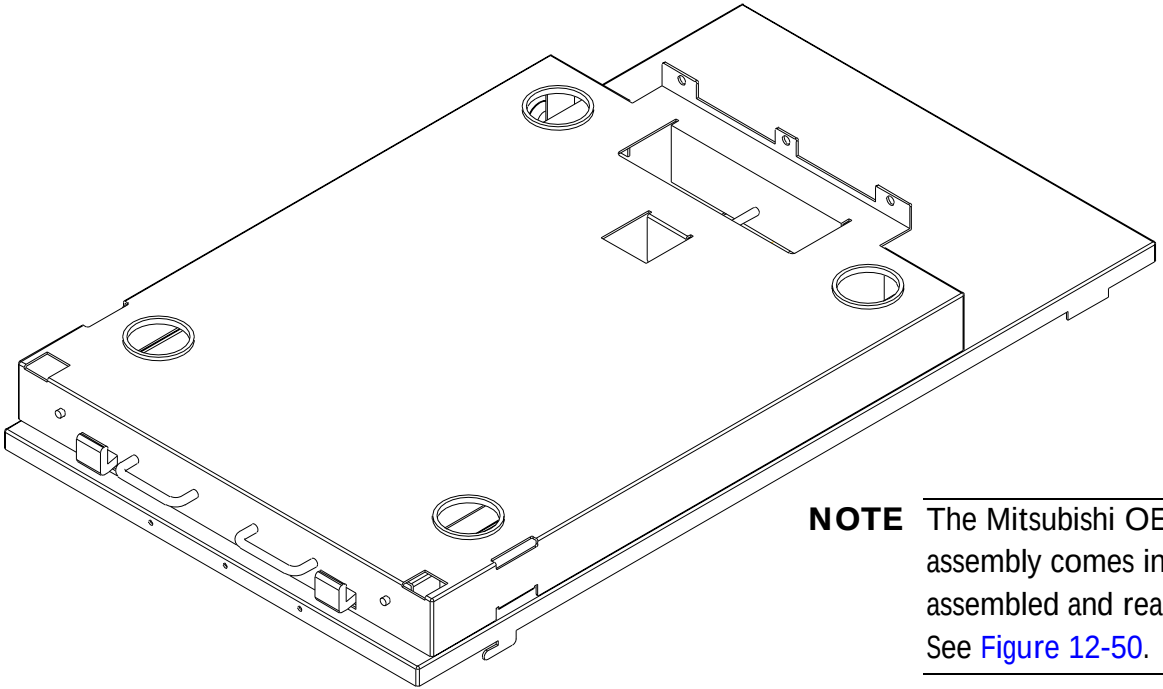
System

Figure 12-48 Cable Drape Assembly



System

Figure 12-49 Mitsubishi CP700/800 OEM Tray Assembly



NOTE The Mitsubishi OEM tray assembly comes in a kit fully assembled and ready to install, See Figure 12-50.

System

Mitsubishi OEM tray assembly
2100-1743-01

Figure 12-50 Mitsubishi CP700/800 OEM "Printer-to-Tray" Hardware

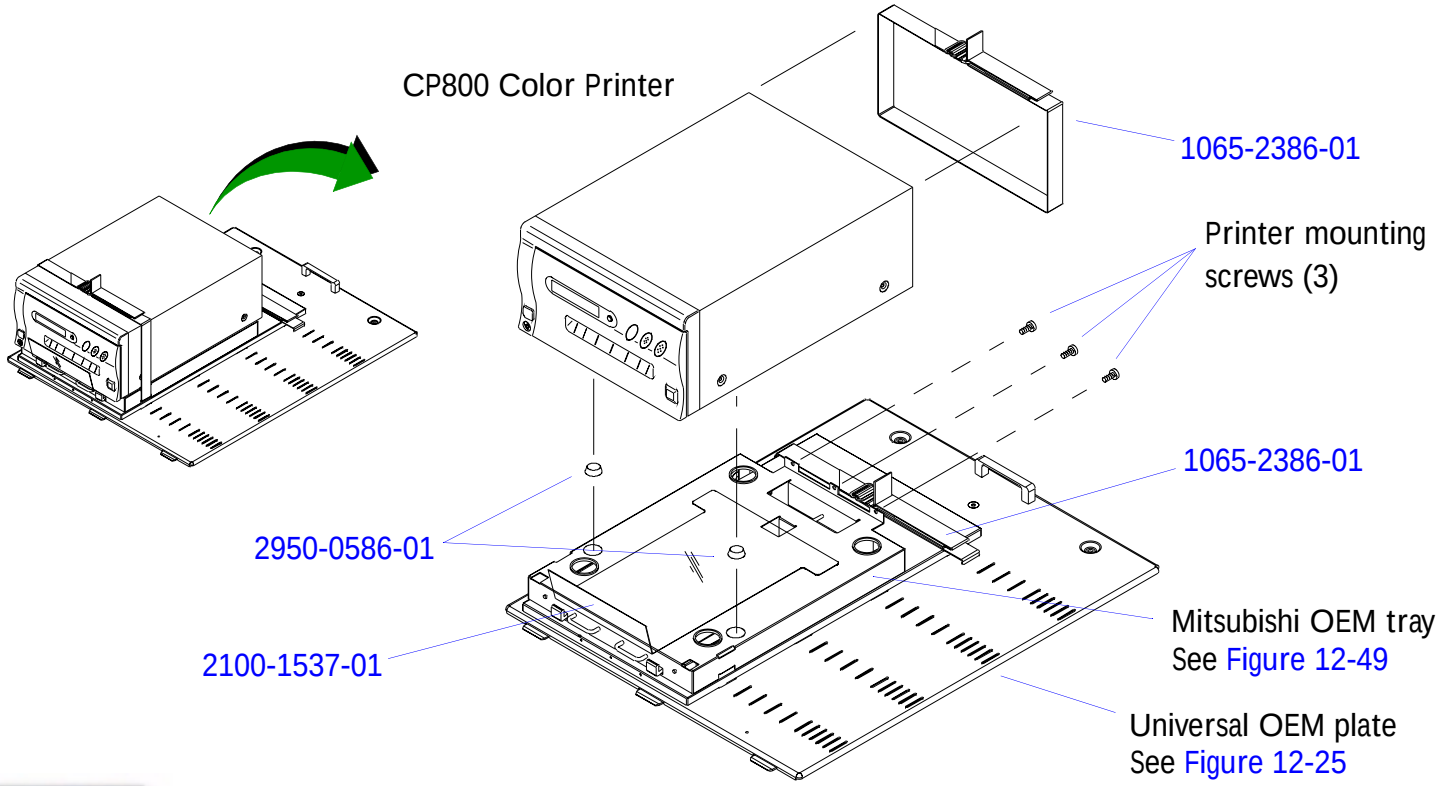
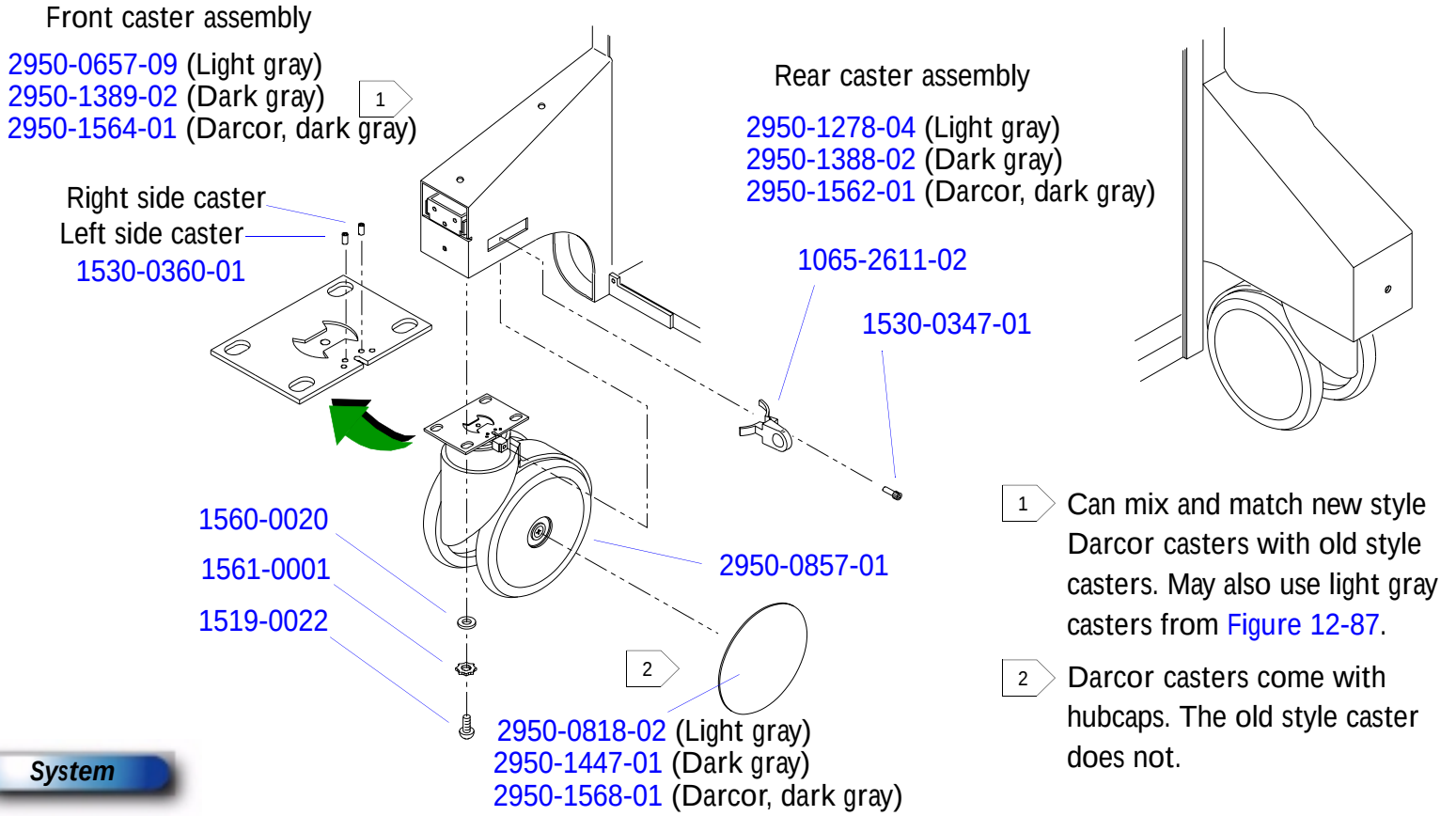


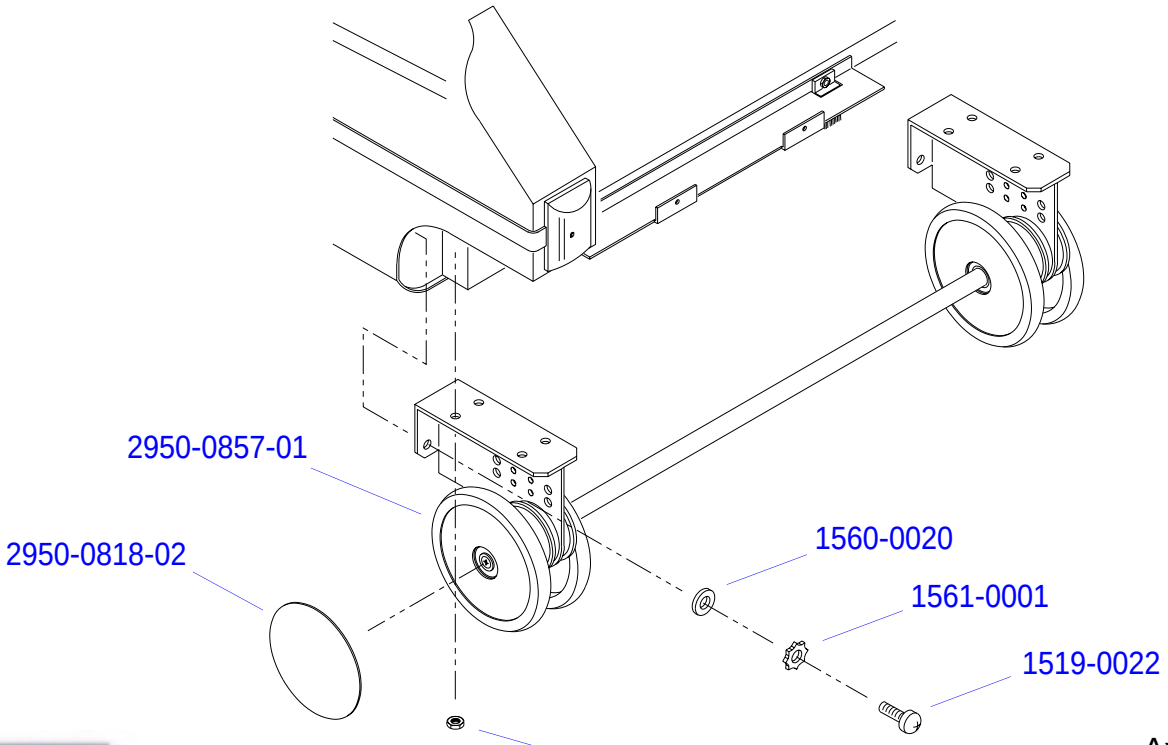
Figure 12-51 System Casters, Swivel Type (Front and Rear)



1 Can mix and match new style Darcor casters with old style casters. May also use light gray casters from Figure 12-87.

2 Darcor casters come with hubcaps. The old style caster does not.

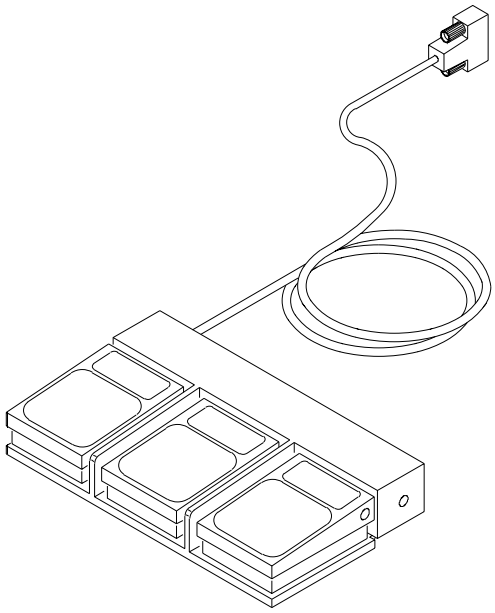
Figure 12-52 System Casters, Axle Type (Rear)



System

Axle type caster assembly
2950-0658-04

Figure 12-53 Footswitch Assemblies



Footswitch assembly
3300-0312-01

Classic Map

Philips Map

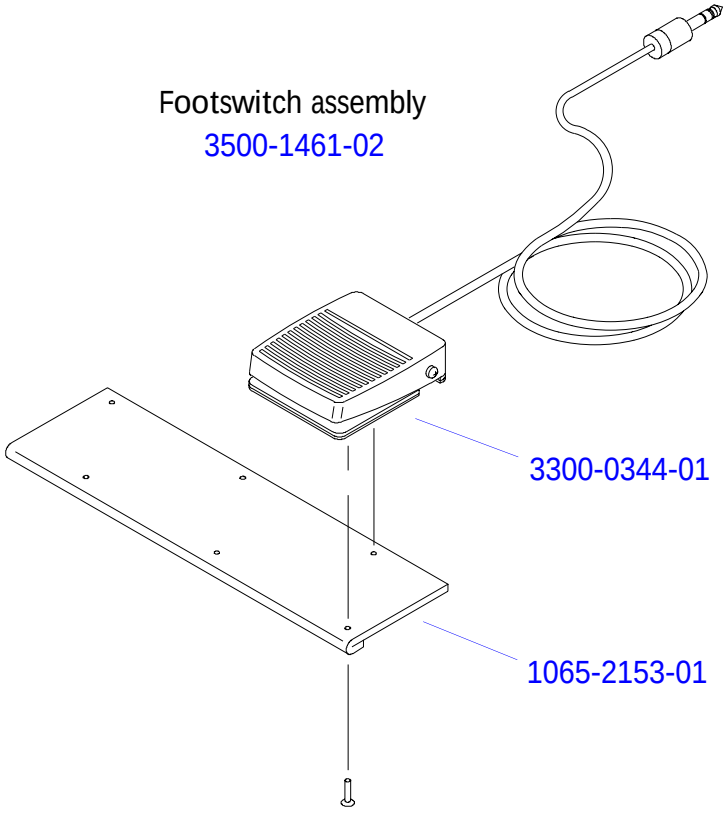


Figure 12-54 Labeling, Upper System

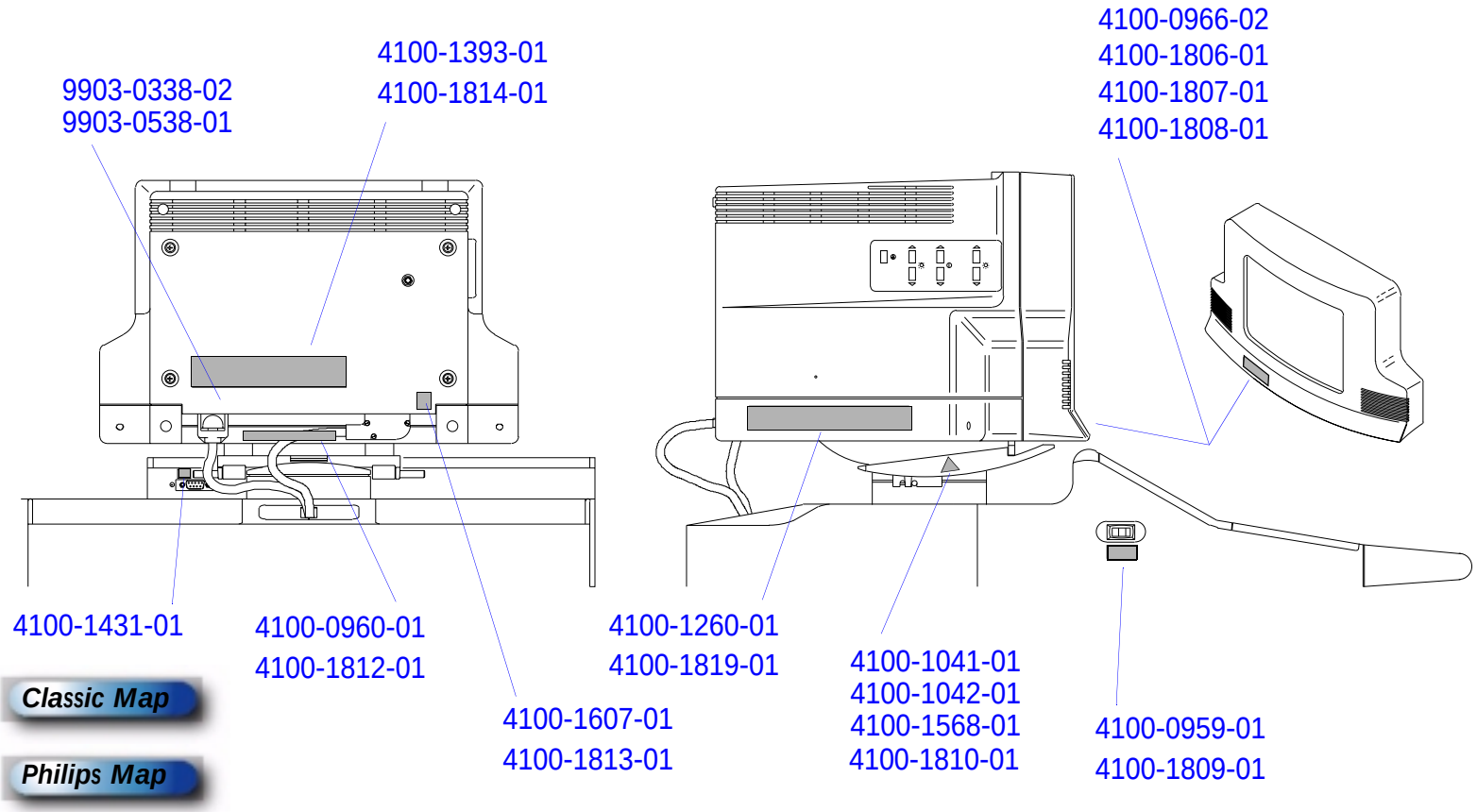
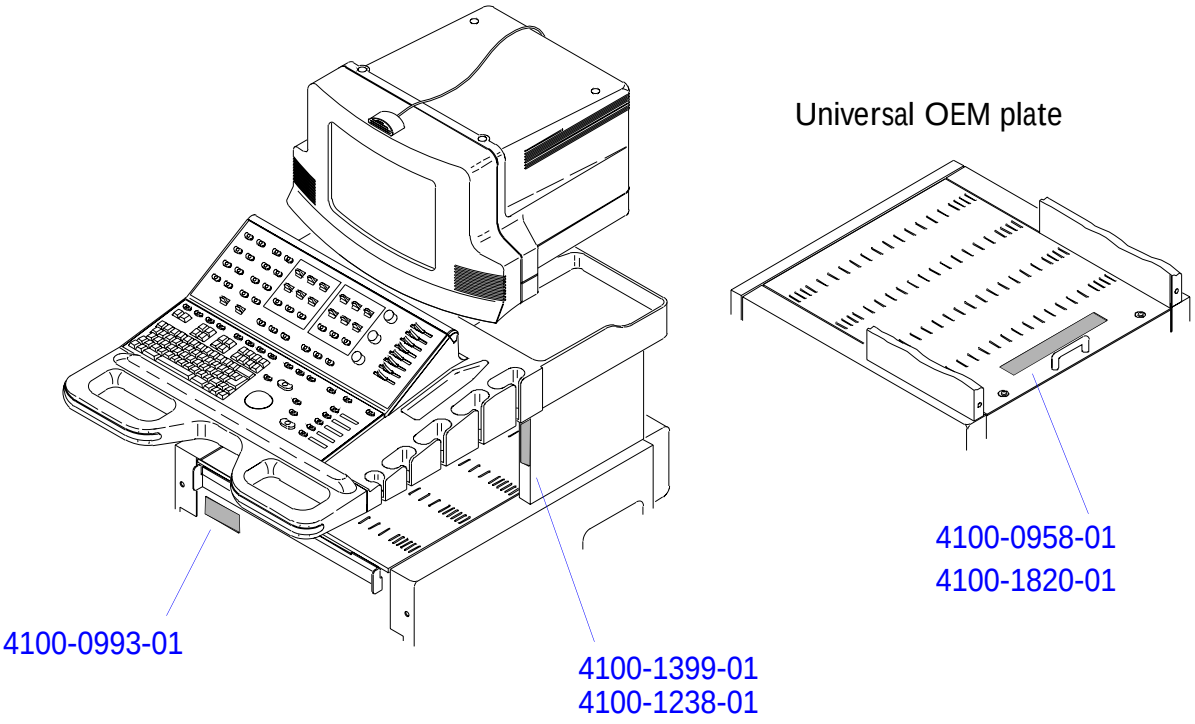


Figure 12-55 Labeling, Mid System



System

Figure 12-56 Labeling, Lower System

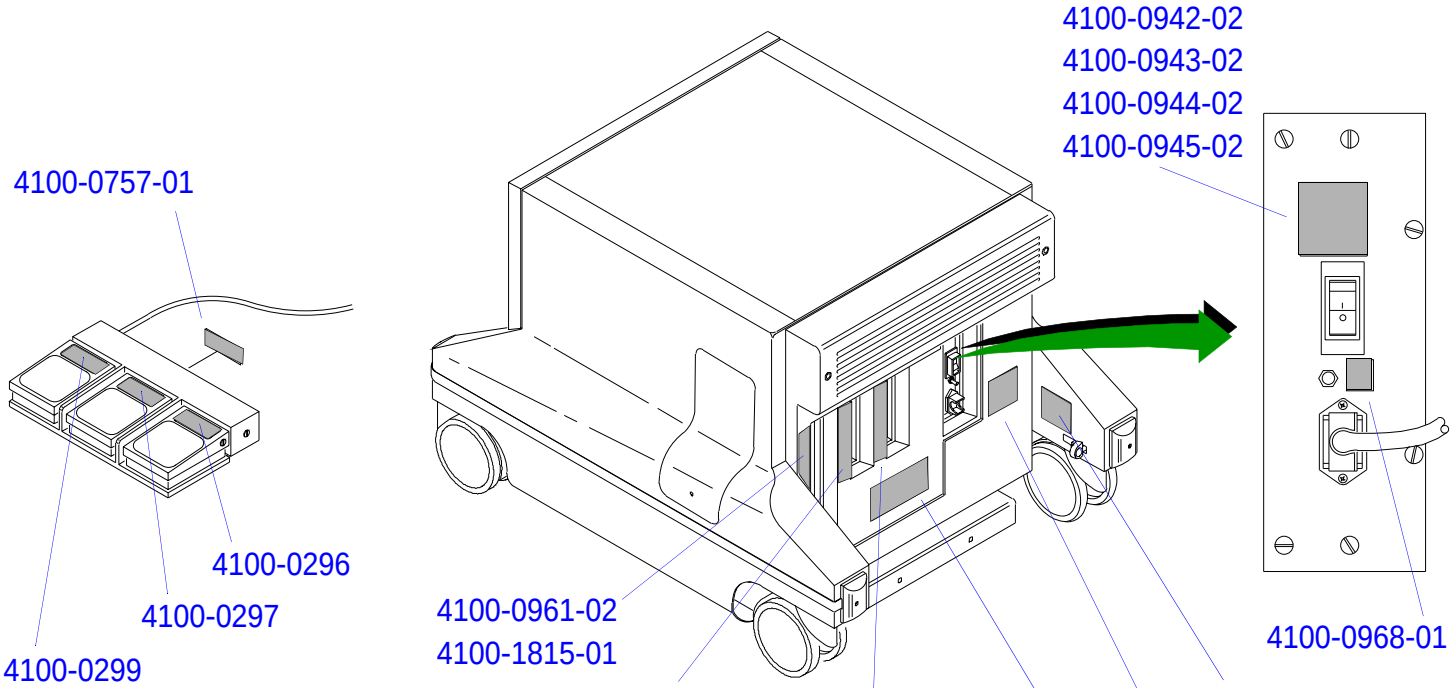
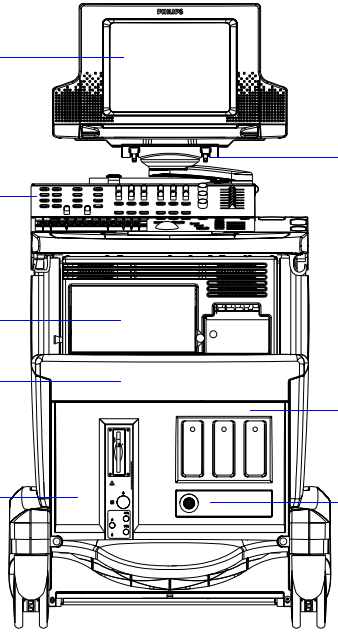


Figure 12-57 Philips HDI 5000 Ultrasound System Parts Locator Map (Front and Rear Ends)

SYSTEM VIEW



Video monitor
See Figure 12-59

Command module
See Figure 12-67

OEM bay
See Figure 12-3

Enclosure covers
See Figure 12-72

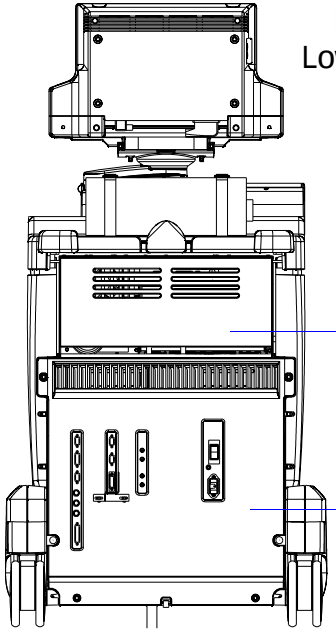
Card cage
See Figure 12-8

Monitor arm
See Figure 12-63

Front compartment
See Figure 12-6

Footswitch
See Figure 12-53

- Front -



System Labels
Upper See Figure 12-54
Mid See Figure 12-55
Lower See Figure 12-56

Enclosure covers
See Figure 12-72

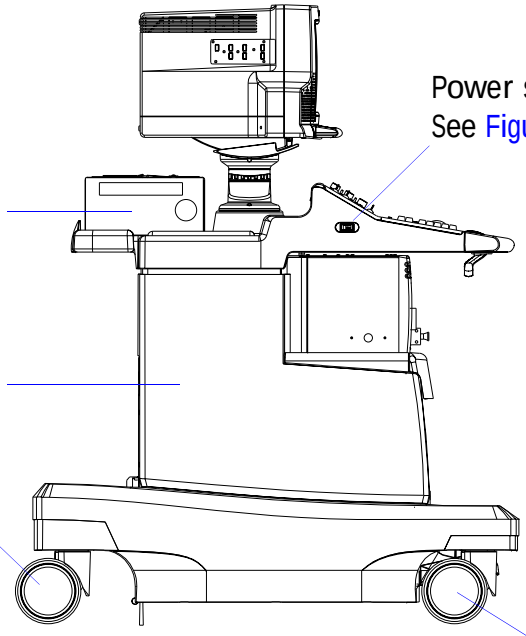
Rear compartment
See Figure 12-84

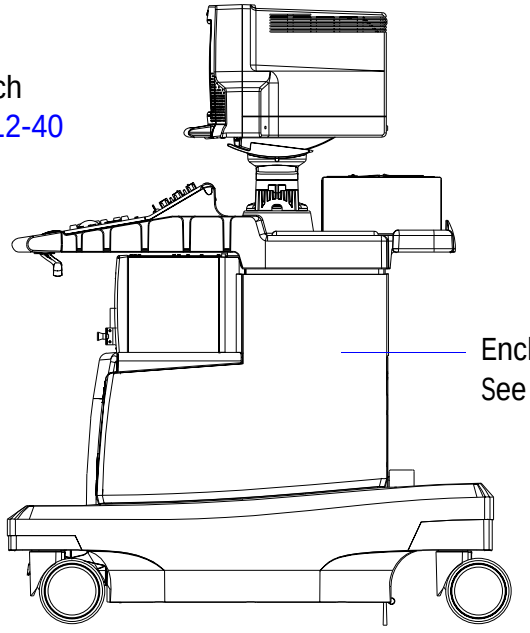
- Rear -

Parts List
Classic Map
Side Views

Figure 12-58 Philips HDI 5000 Ultrasound System Parts Locator Map (Left and Right Sides)

SYSTEM VIEW





Power switch
See Figure 12-40

VCR
See Figure 12-71

Enclosure covers
See Figure 12-72

Rear caster
See Figure 12-87

Enclosure covers
See Figure 12-72

- Left -

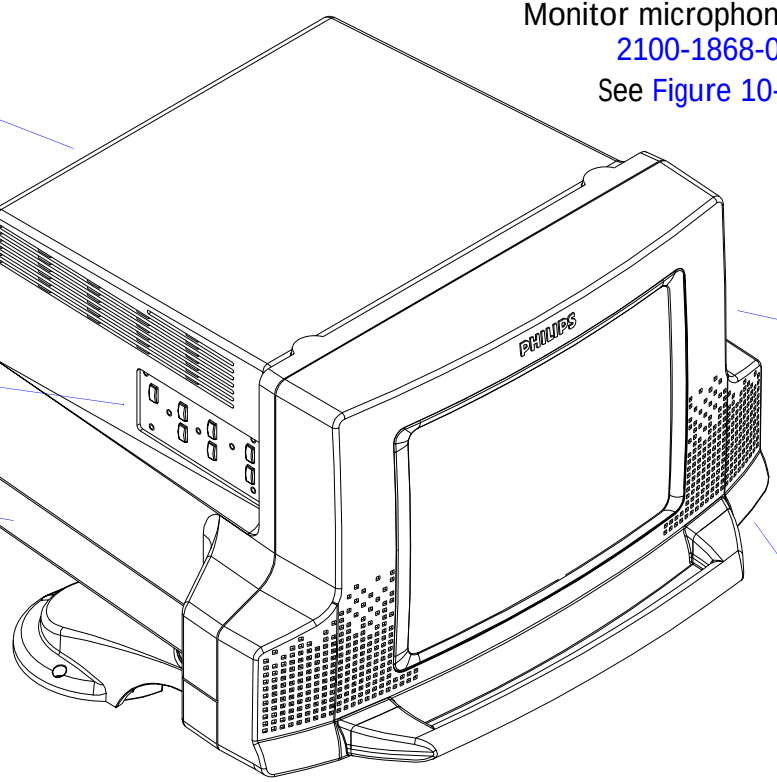
Front caster
See Figure 12-87

- Right -

Parts List
Classic Map
End Views

Figure 12-59 Video Monitor Assembly, Philips HDI 5000

PARENT VIEW



Monitor covers
See Figure 12-60

Monitor microphone
2100-1868-01
See Figure 10-7

Monitor control panel
See Figure 12-29

Monitor chassis
See Figure 12-28

Monitor arm
See Figure 12-63

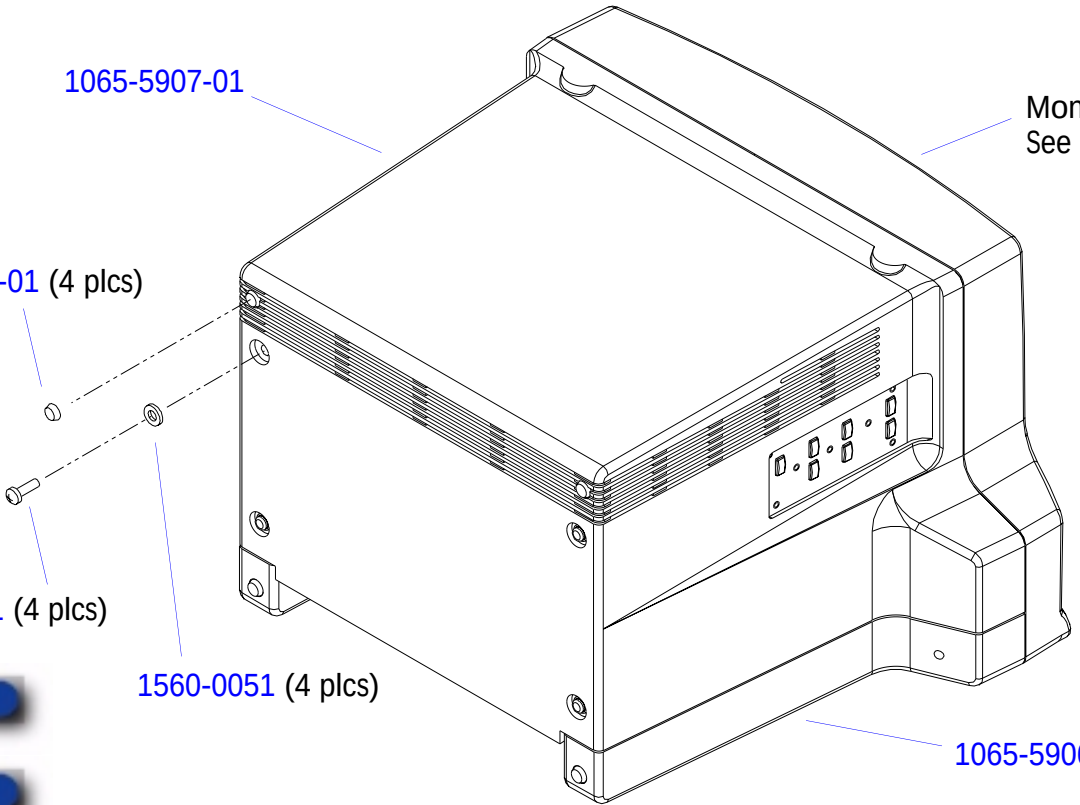
Monitor bezel
See Figure 12-61

Monitor bezel light bar
See Figure 12-62

Video Monitor Assembly
3500-3434-01

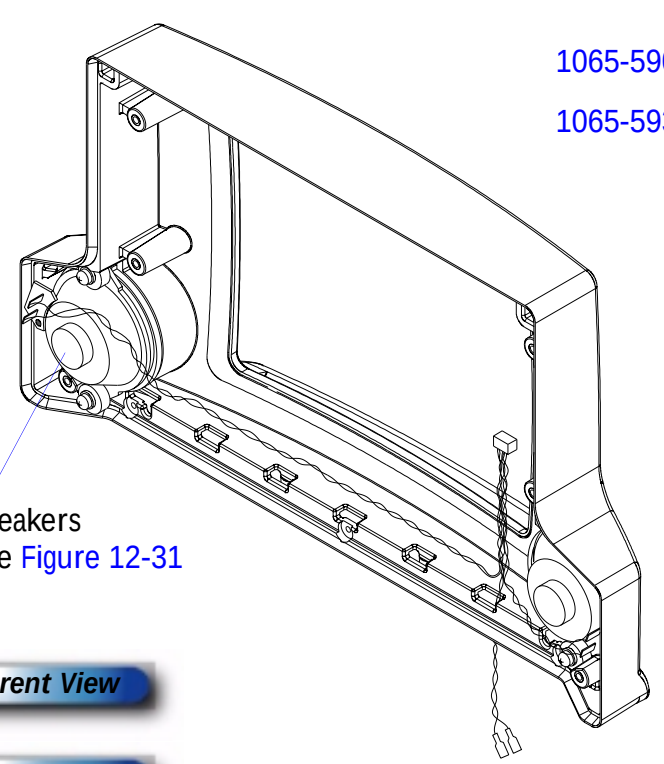
System

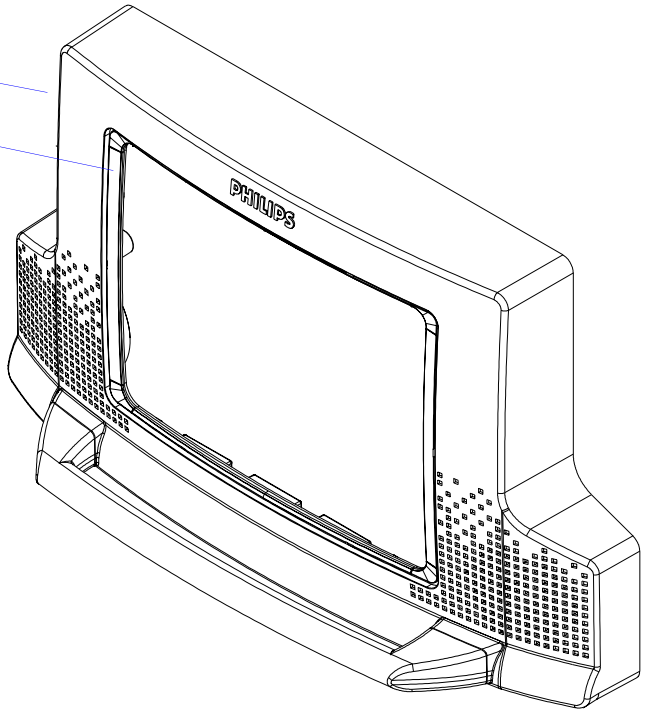
Figure 12-60 Video Monitor Covers, Philips HDI 5000



Parent View
System

Figure 12-61 Video Monitor Bezel, Philips HDI 5000





1065-5904-01

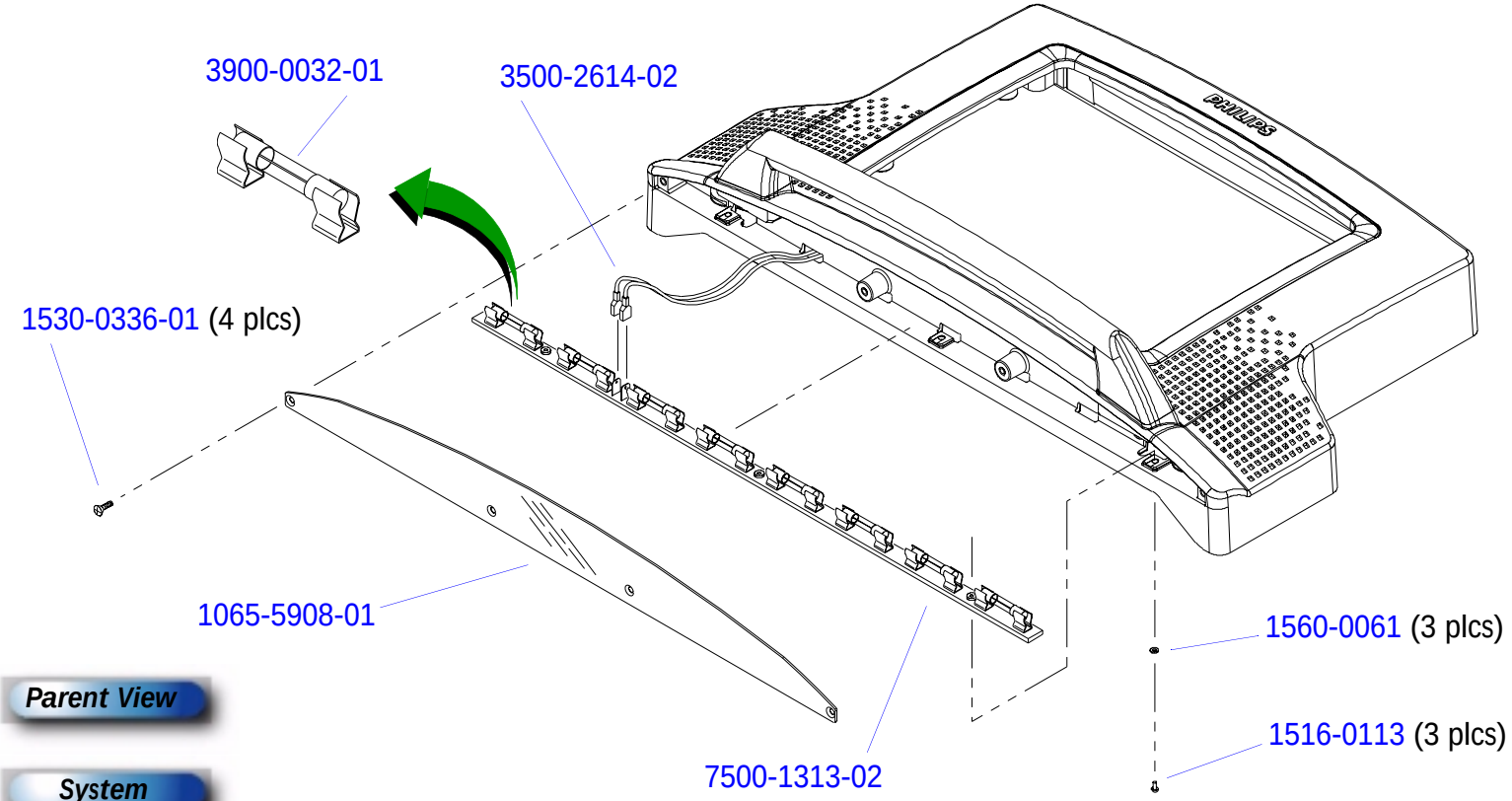
1065-5932-01

Speakers
See Figure 12-31

Monitor bezel assembly
3000-0814-01

Parent View
System

Figure 12-62 Video Monitor Bezel Light Bar, Philips HDI 5000

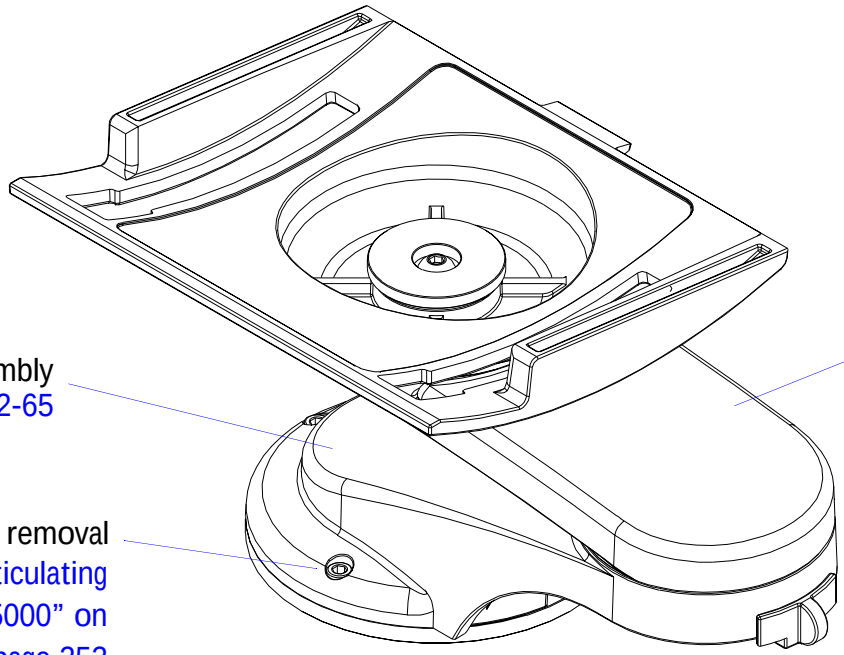


Parent View

System

Figure 12-63 Monitor Articulating Arm Assembly, Philips HDI 5000

PARENT VIEW



Lower arm assembly
See Figure 12-65

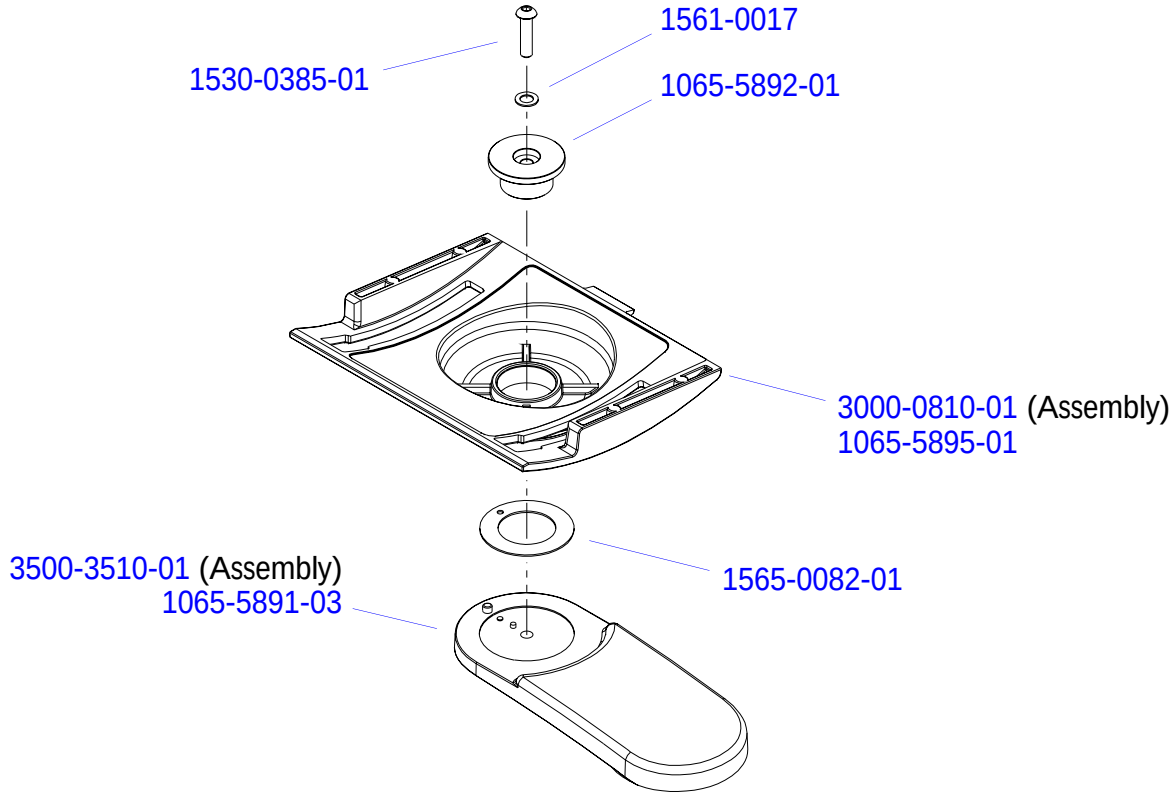
Upper arm assembly
See Figure 12-64

Articulating arm removal
Refer to "Monitor Articulating Arm, Philips HDI 5000" on page 253

System

Articulating arm assembly
3500-3423-03

Figure 12-64 Monitor Articulating Arm Assembly (Upper), Philips HDI 5000



Parent View

System

Figure 12-65 Monitor Articulating Arm Assembly (Lower), Philips HDI 5000

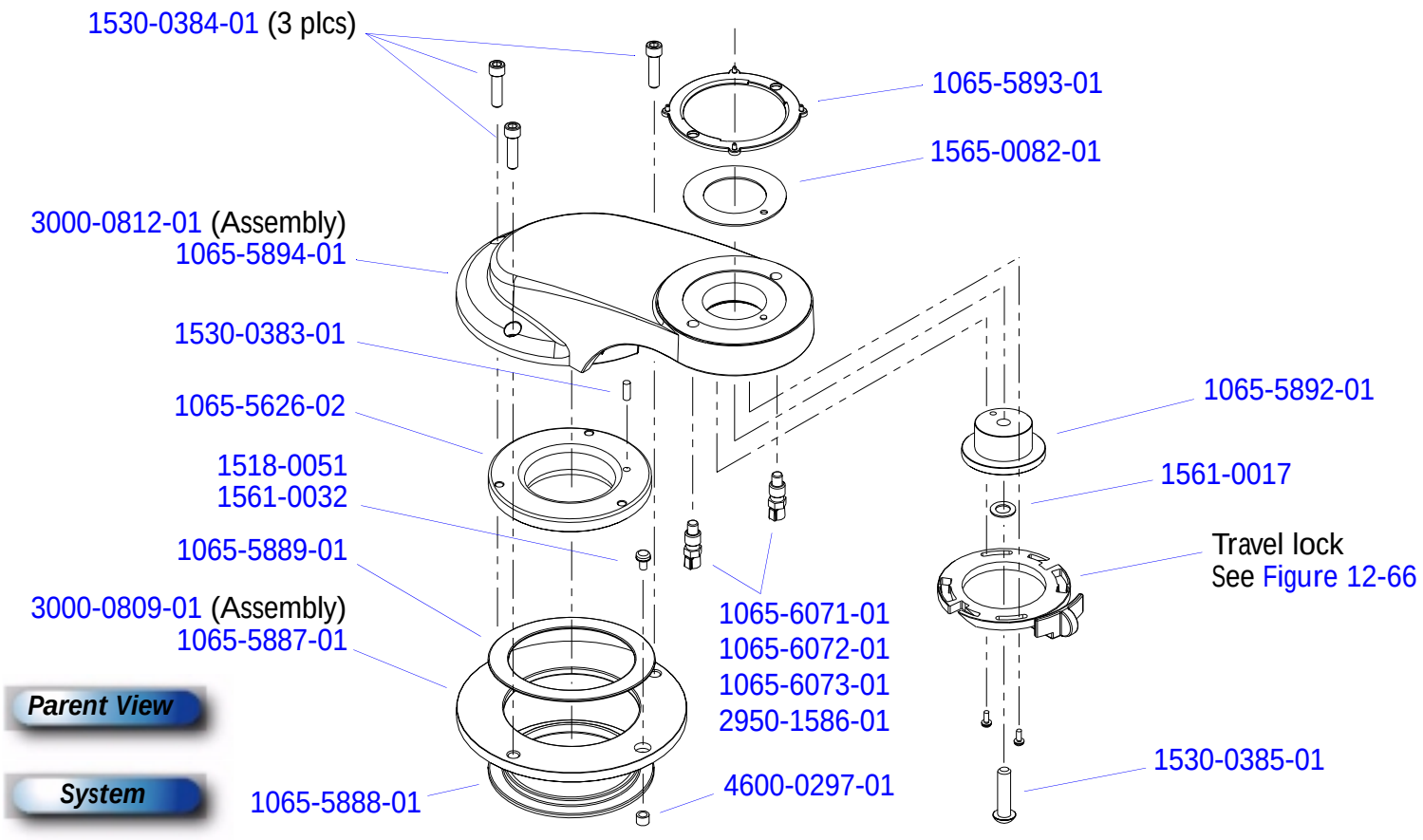
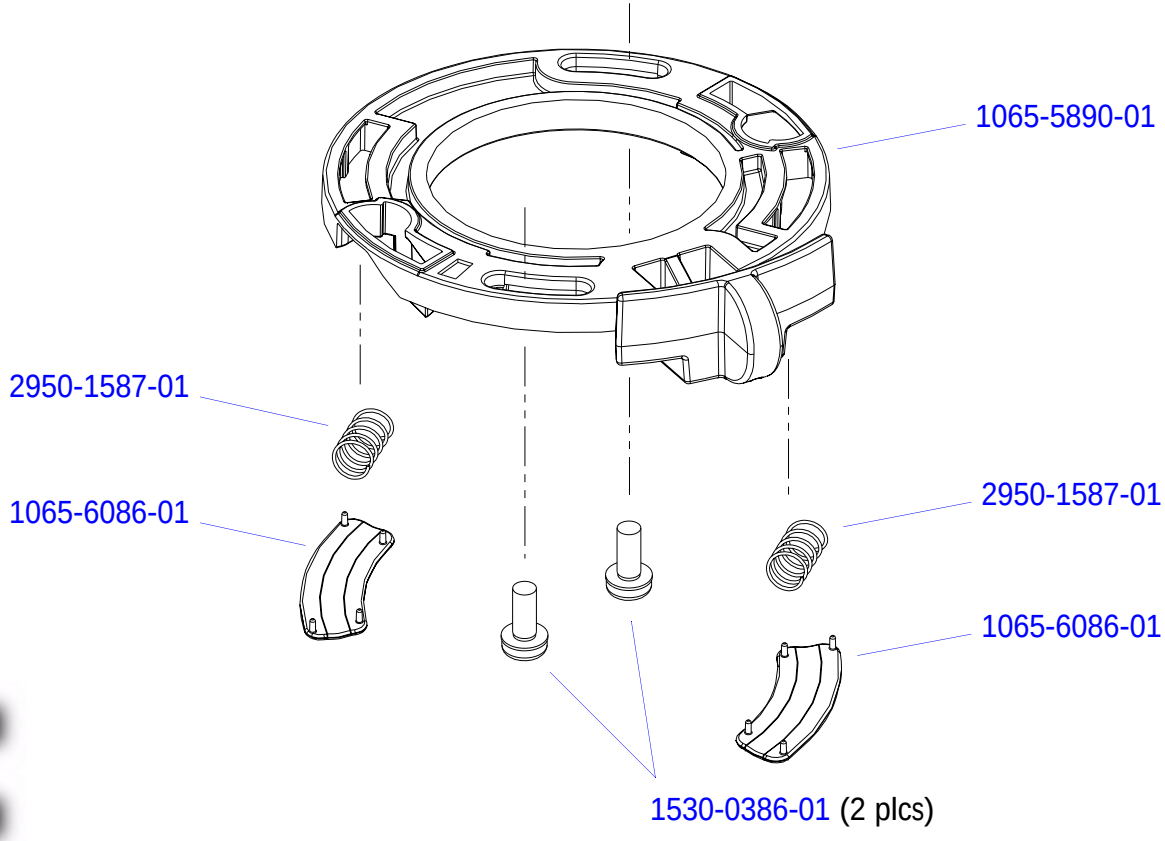


Figure 12-66 Articulating Arm Travel Lock, Philips HDI 5000

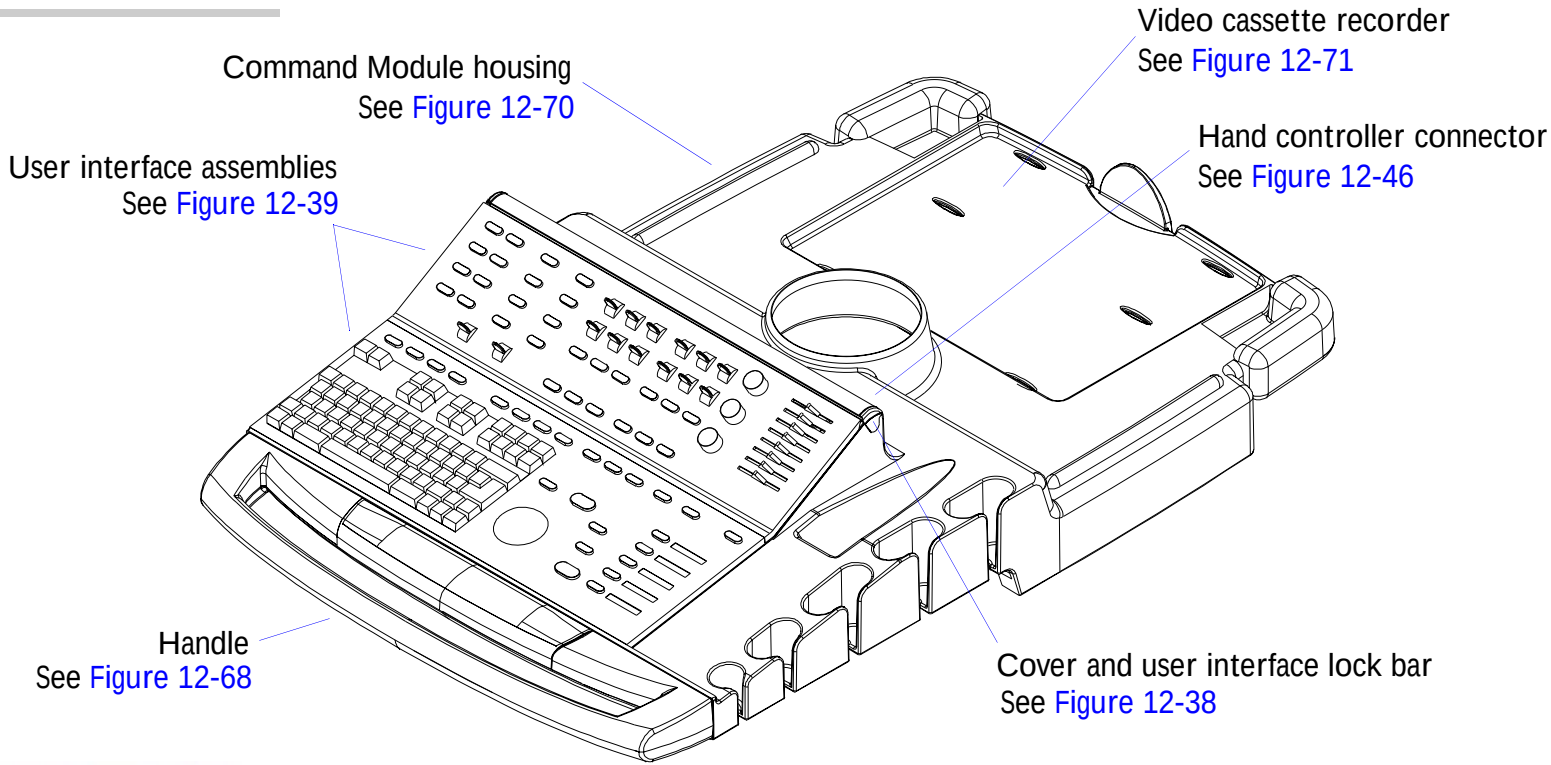


Parent View

System

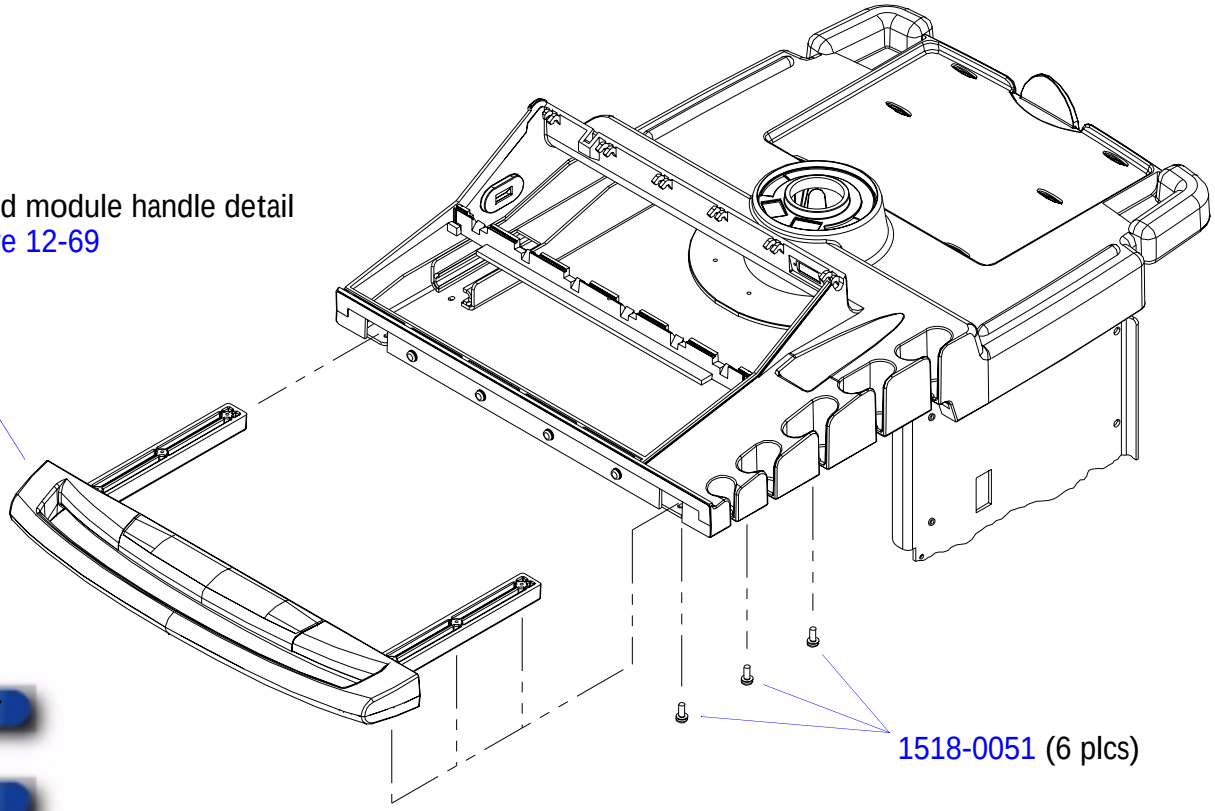
Figure 12-67 Command Module, Philips HDI 5000

PARENT VIEW



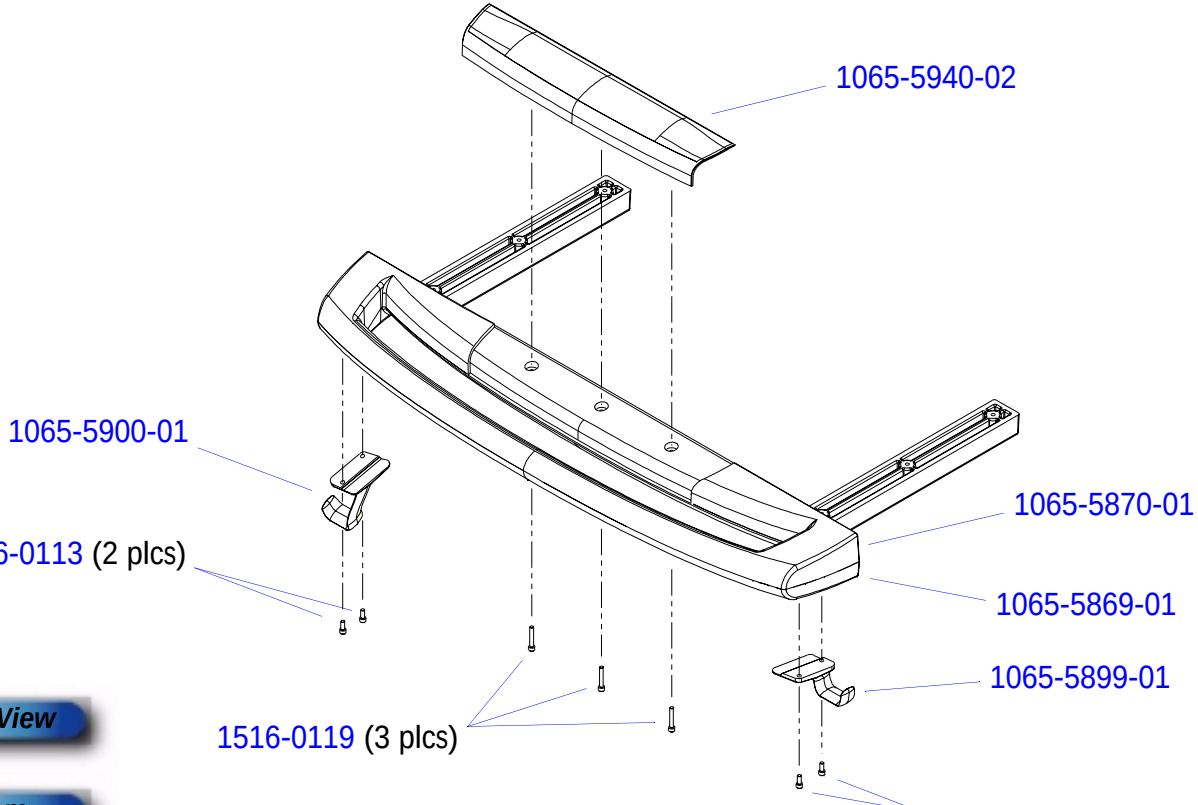
System

Figure 12-68 Command Module Handle, Philips HDI 5000



Parent View
System

Figure 12-69 Command Module Handle Detail, Philips HDI 5000

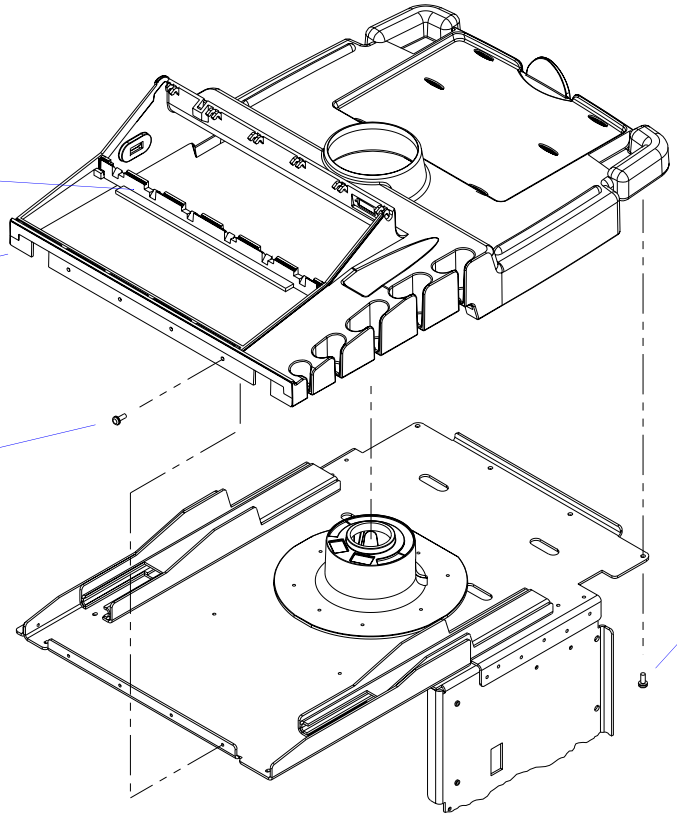


Parent View

System

Handle Assembly
3000-0806-01

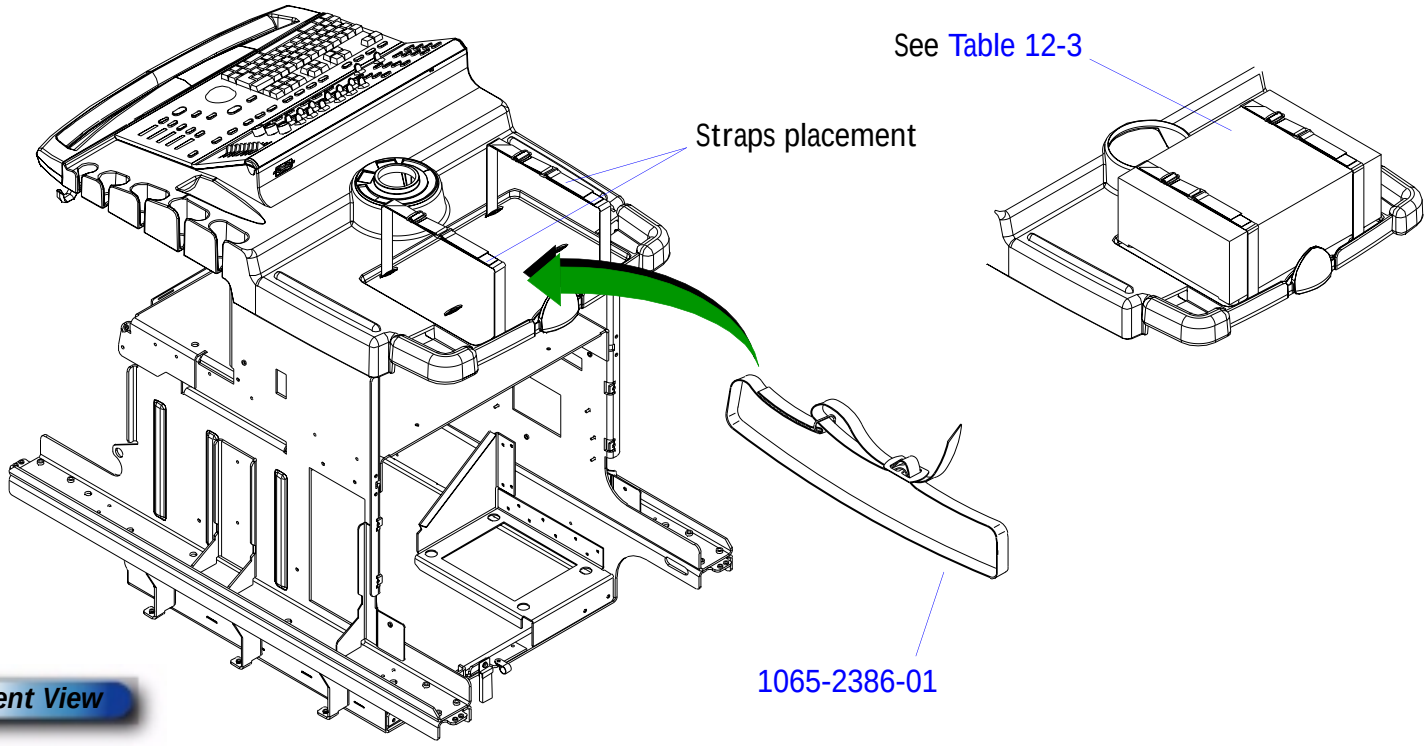
Figure 12-70 Command Module Housing, Philips HDI 5000



Command Module cover assembly
3000-0808-01

Parent View
System

Figure 12-71 Video Cassette Recorder (VCR), Philips HDI 5000



Parent View

System

Figure 12-72 Enclosure Covers, Philips HDI 5000

PARENT VIEW

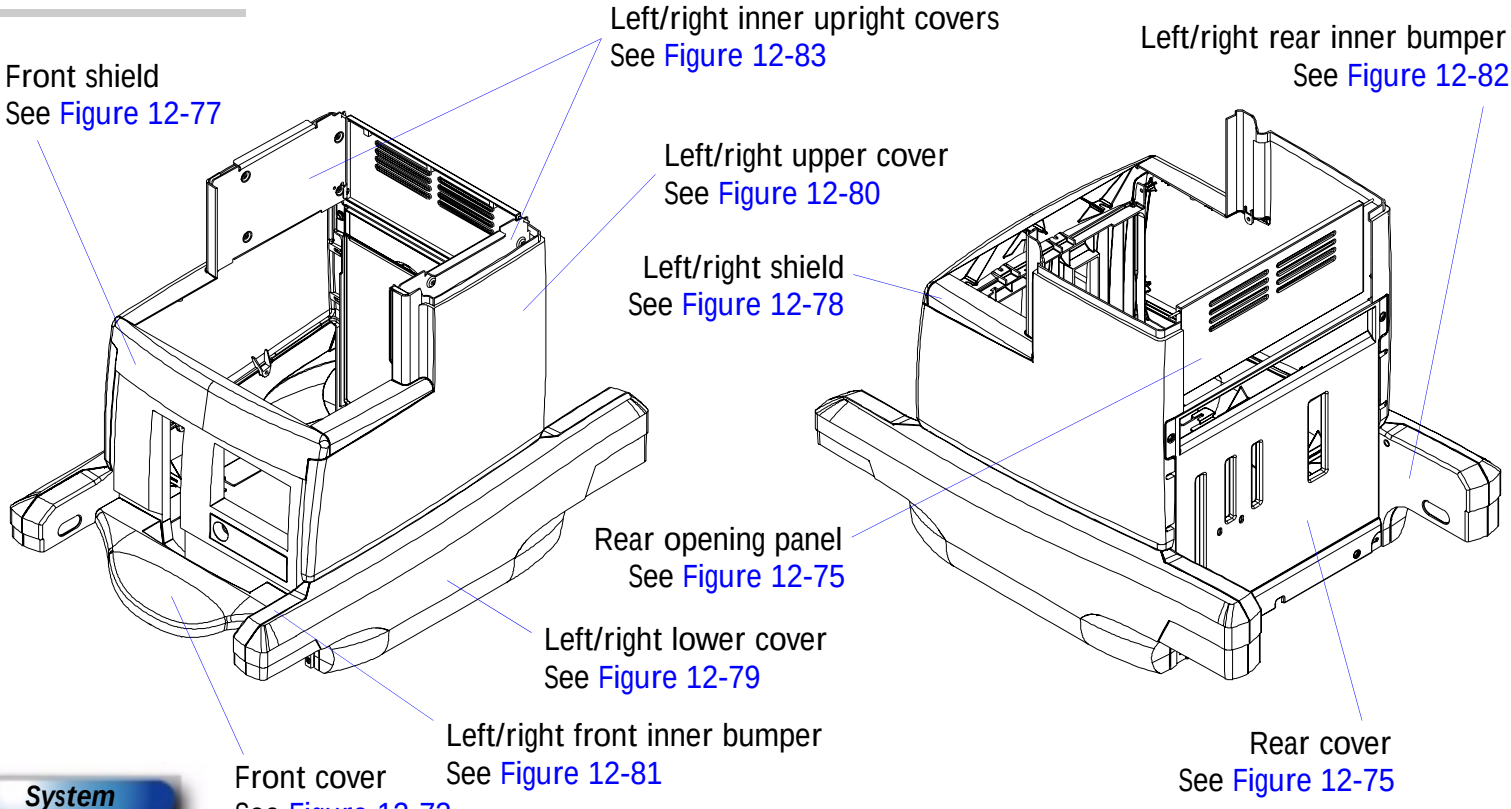
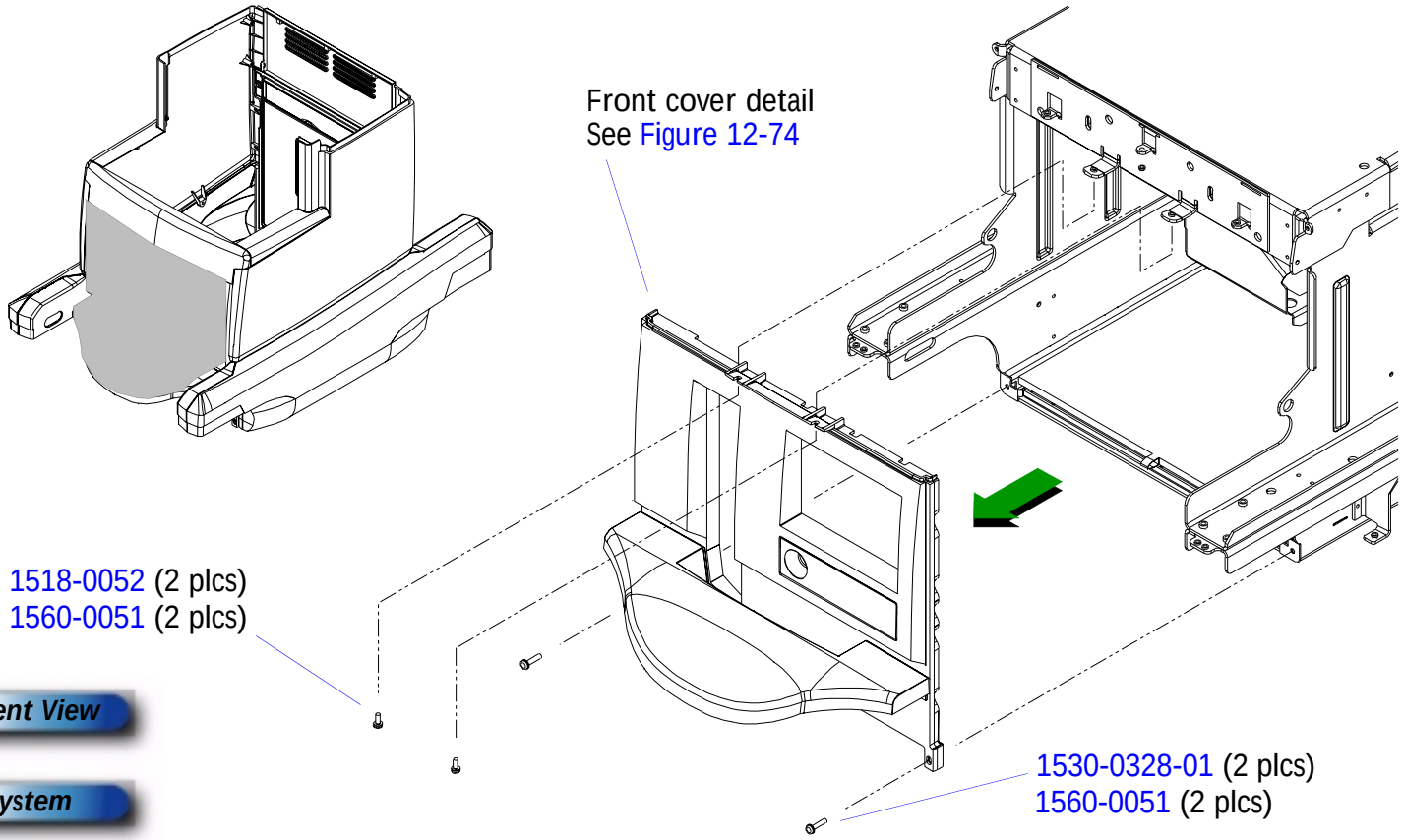
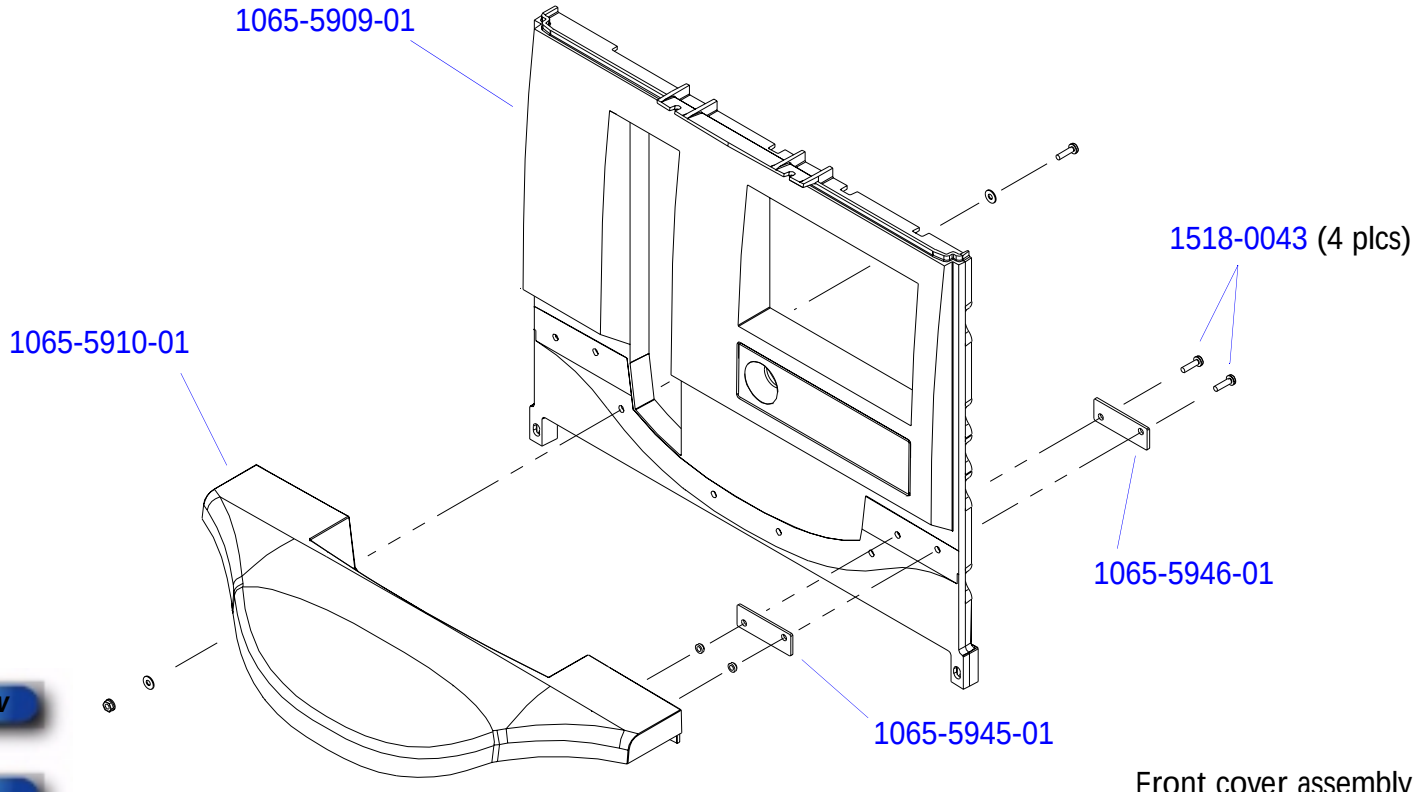


Figure 12-73 Front Cover, Philips HDI 5000



Parent View
System

Figure 12-74 Front Cover Detail, Philips HDI 5000

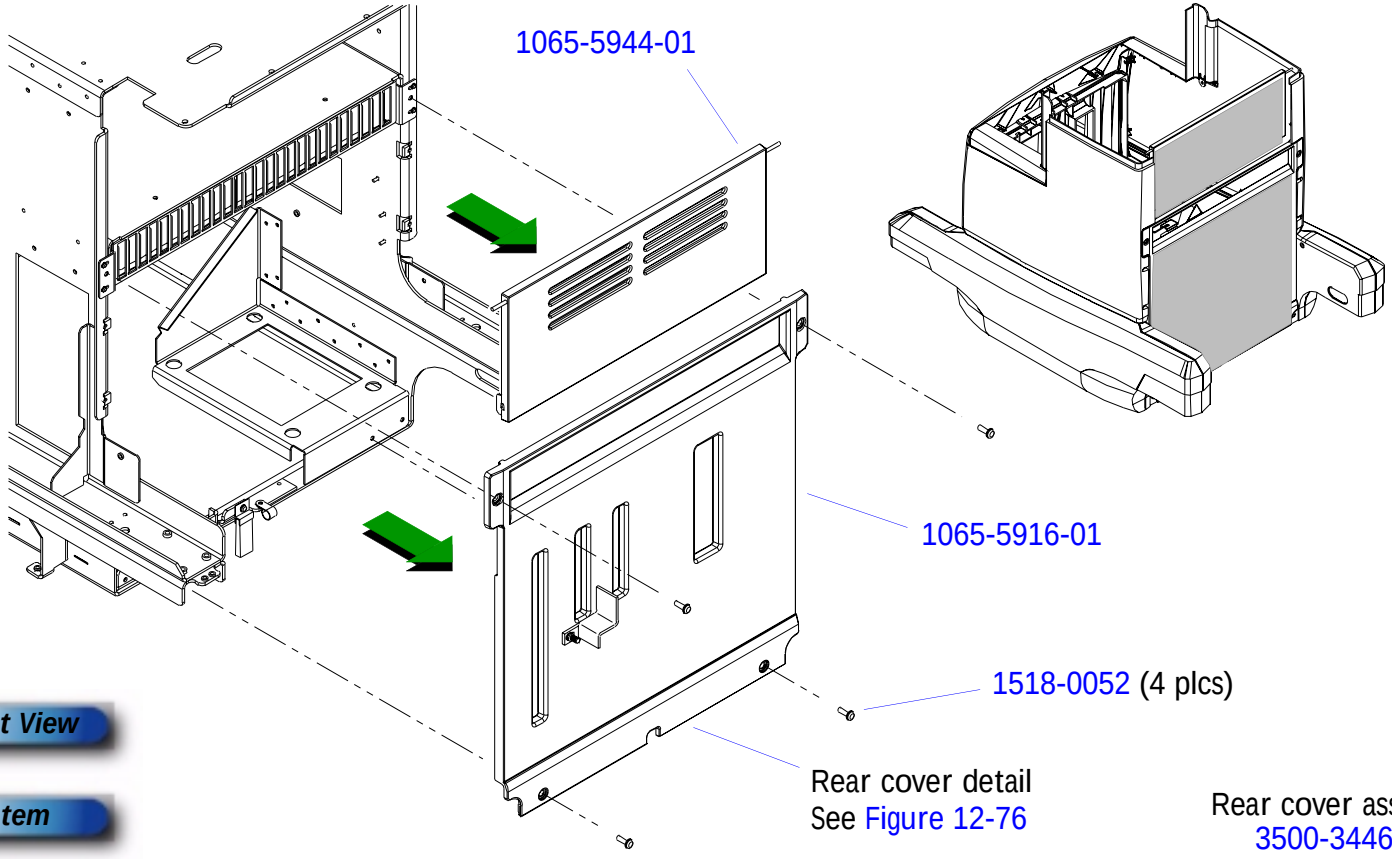


Parent View

System

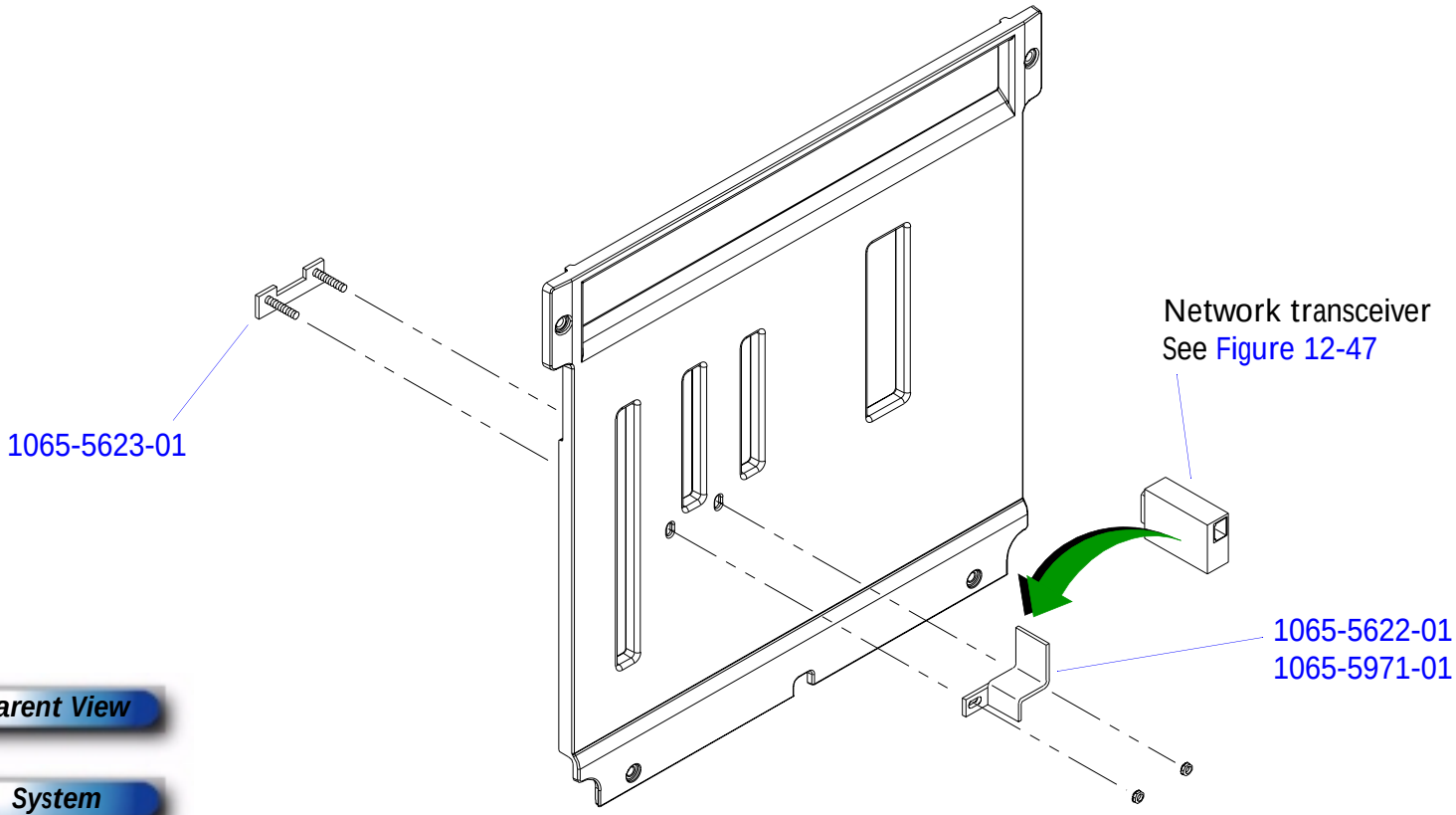
Front cover assembly
3500-3425-01

Figure 12-75 Rear Cover and Rear Opening Panel, Philips HDI 5000



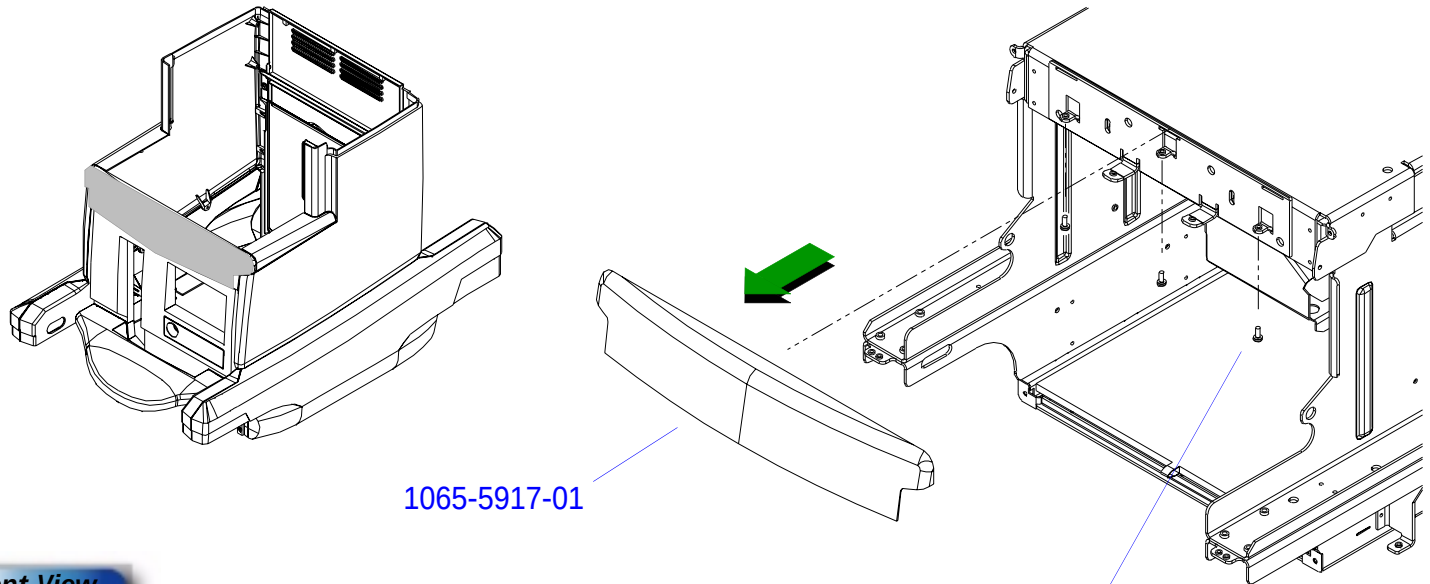
Parent View
System

Figure 12-76 Rear Cover Detail (Transceiver Bracket)



Parent View
System

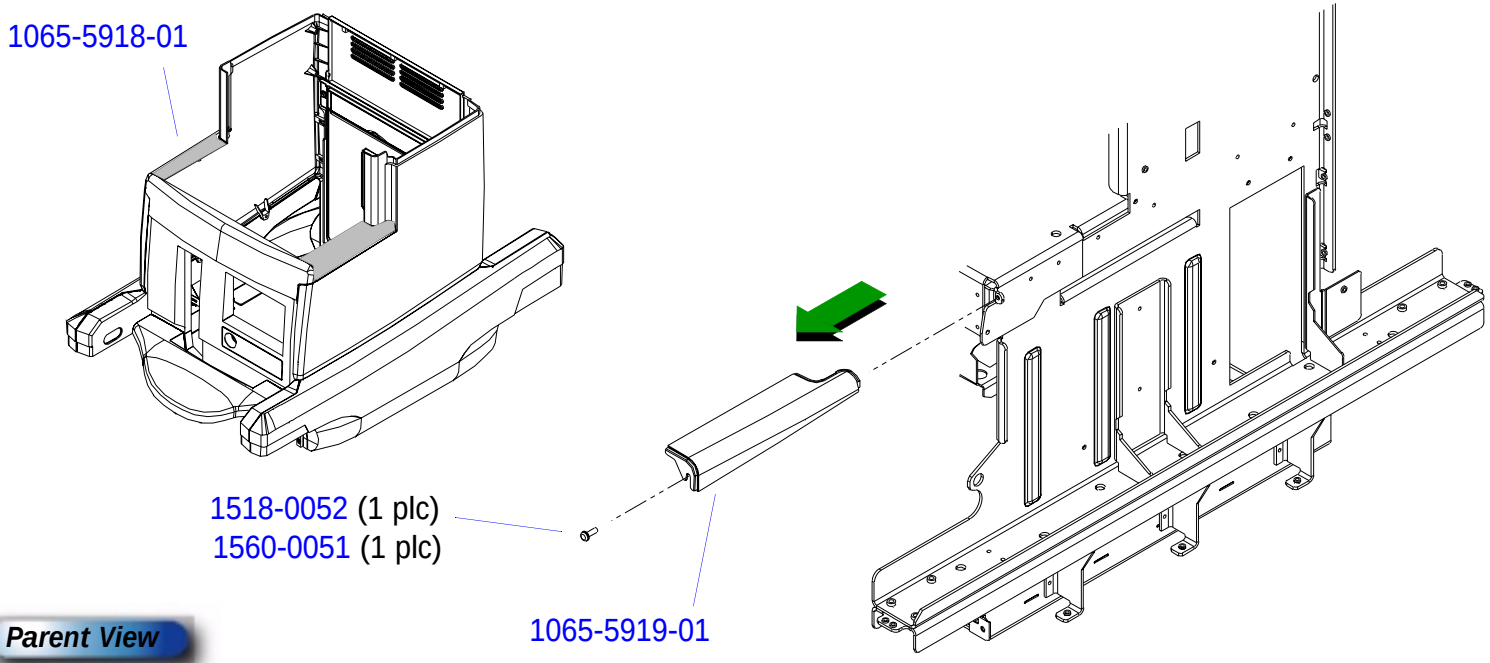
Figure 12-77 Front Shield, Philips HDI 5000



Parent View
System

Figure 12-78 Left/Right Shield (Right Shown), Philips HDI 5000

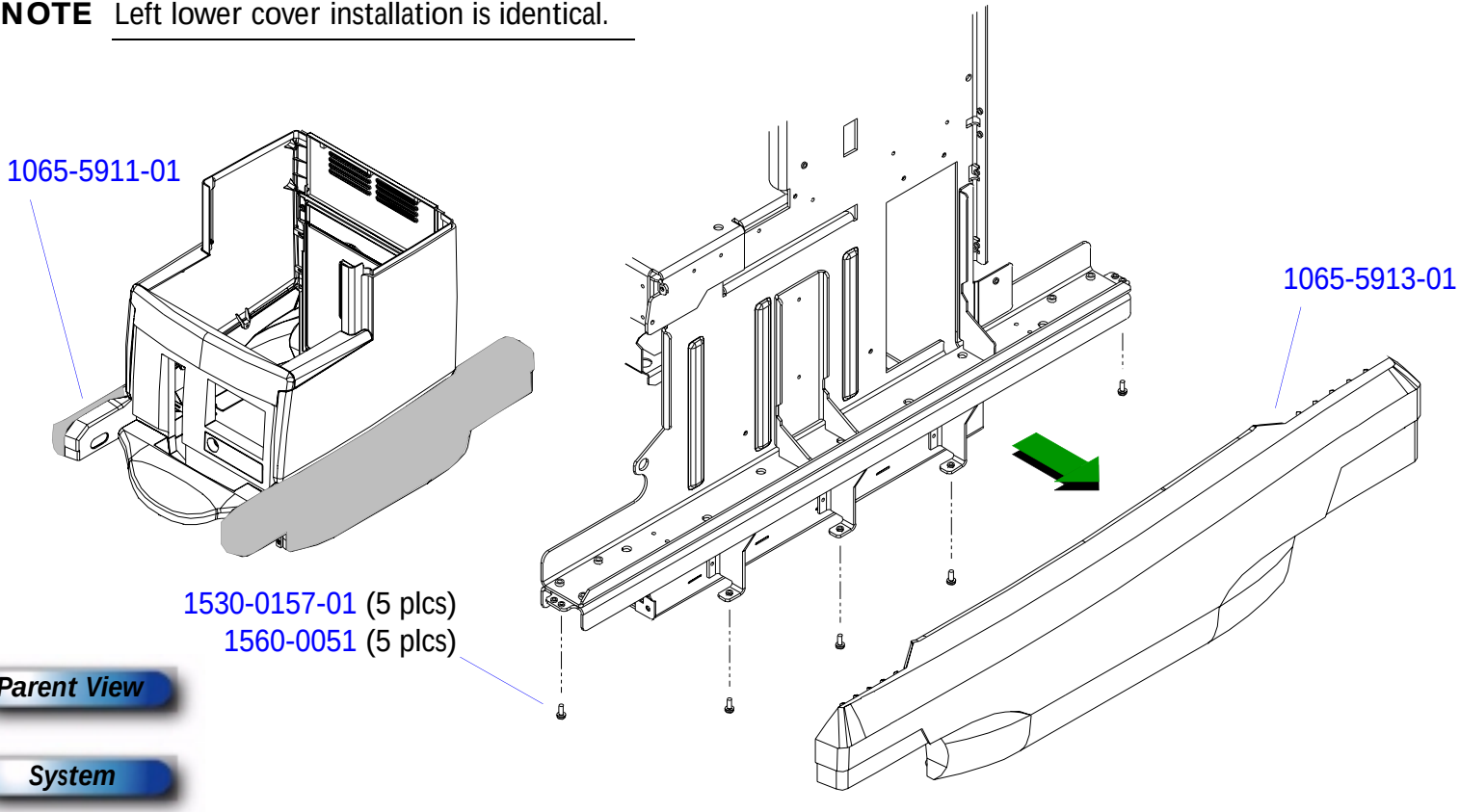
NOTE Left shield installation is identical.



Parent View
System

Figure 12-79 Left/Right Lower Cover (Right Shown), Philips HDI 5000

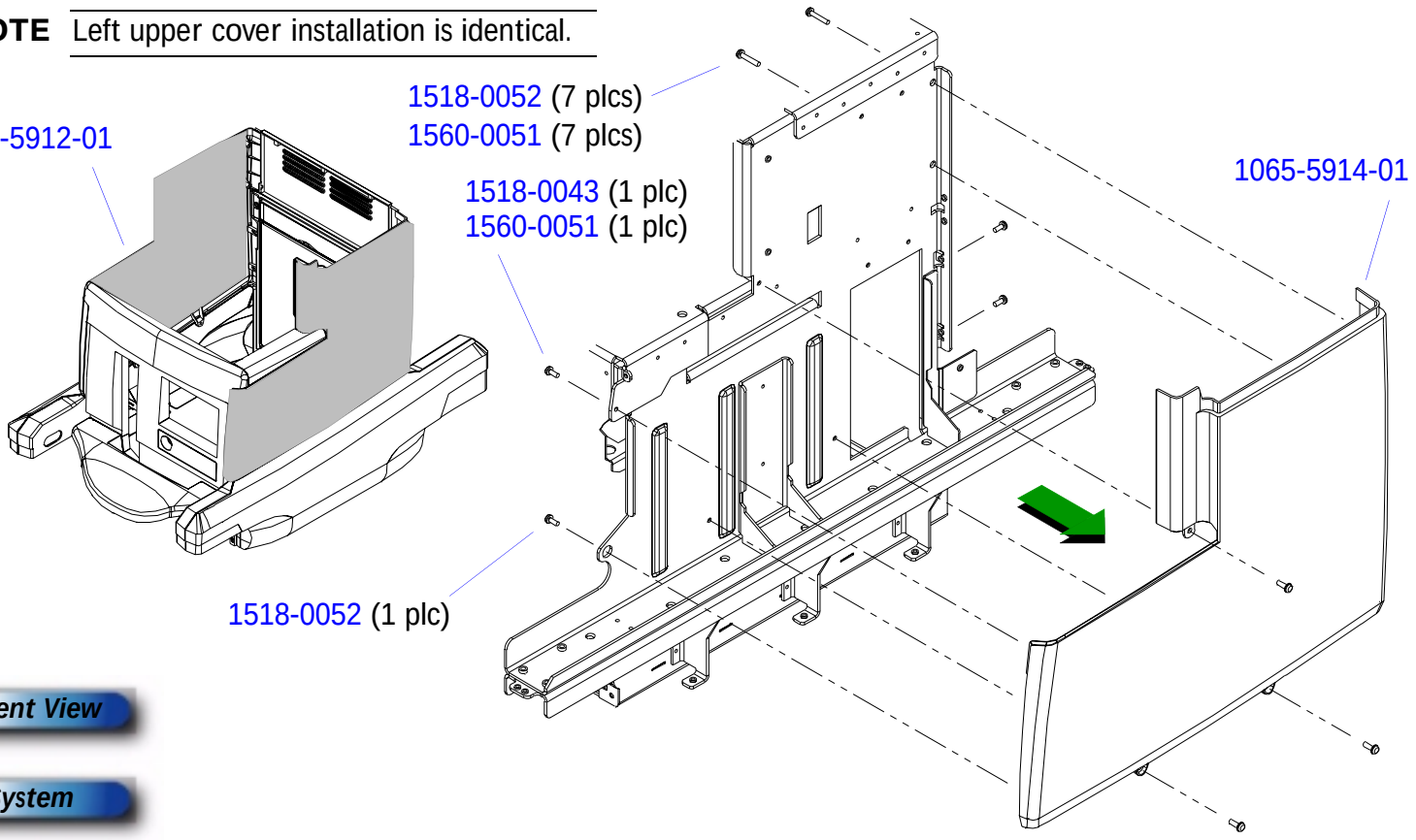
NOTE Left lower cover installation is identical.



Parent View
System

Figure 12-80 Left/Right Upper Cover (Right Shown), Philips HDI 5000

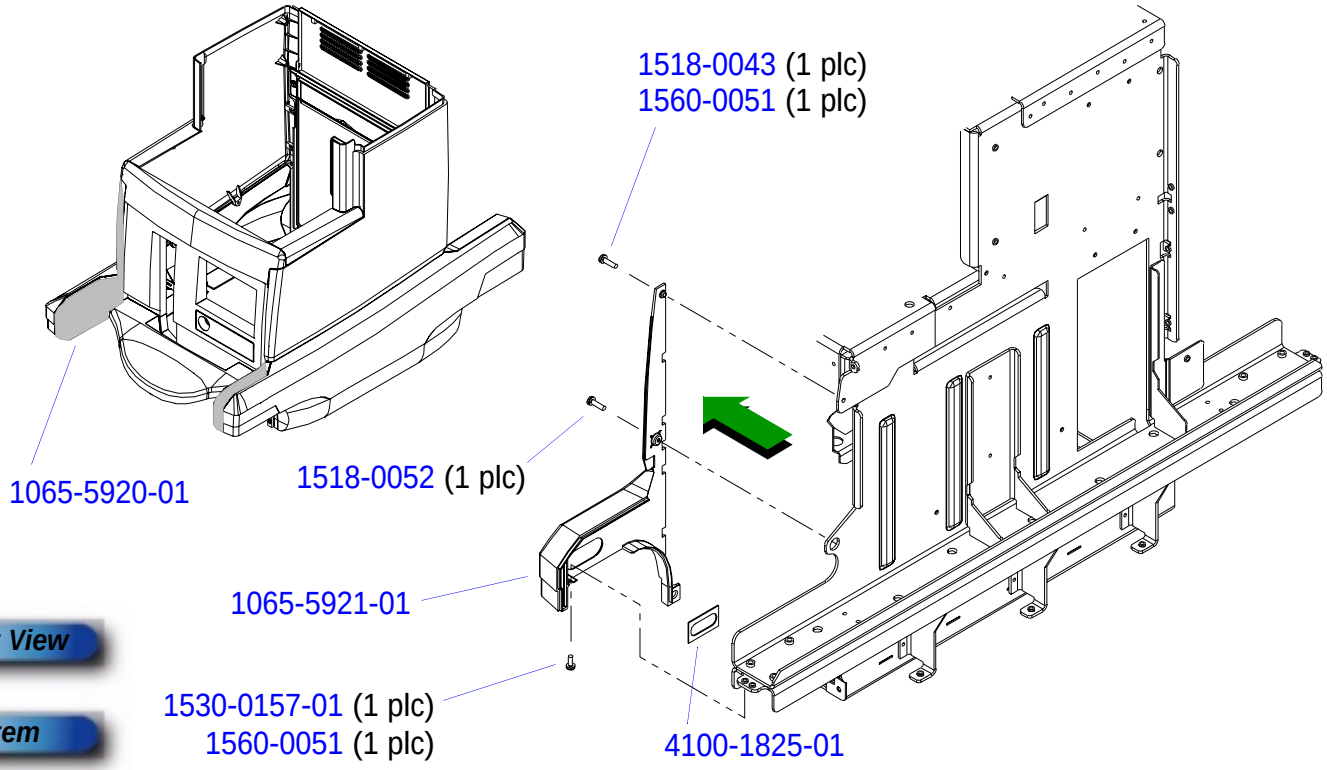
NOTE Left upper cover installation is identical.



Parent View
System

Figure 12-81 Left/Right Front Inner Bumper (Right Shown), Philips HDI 5000

NOTE Left front inner bumper installation is identical.

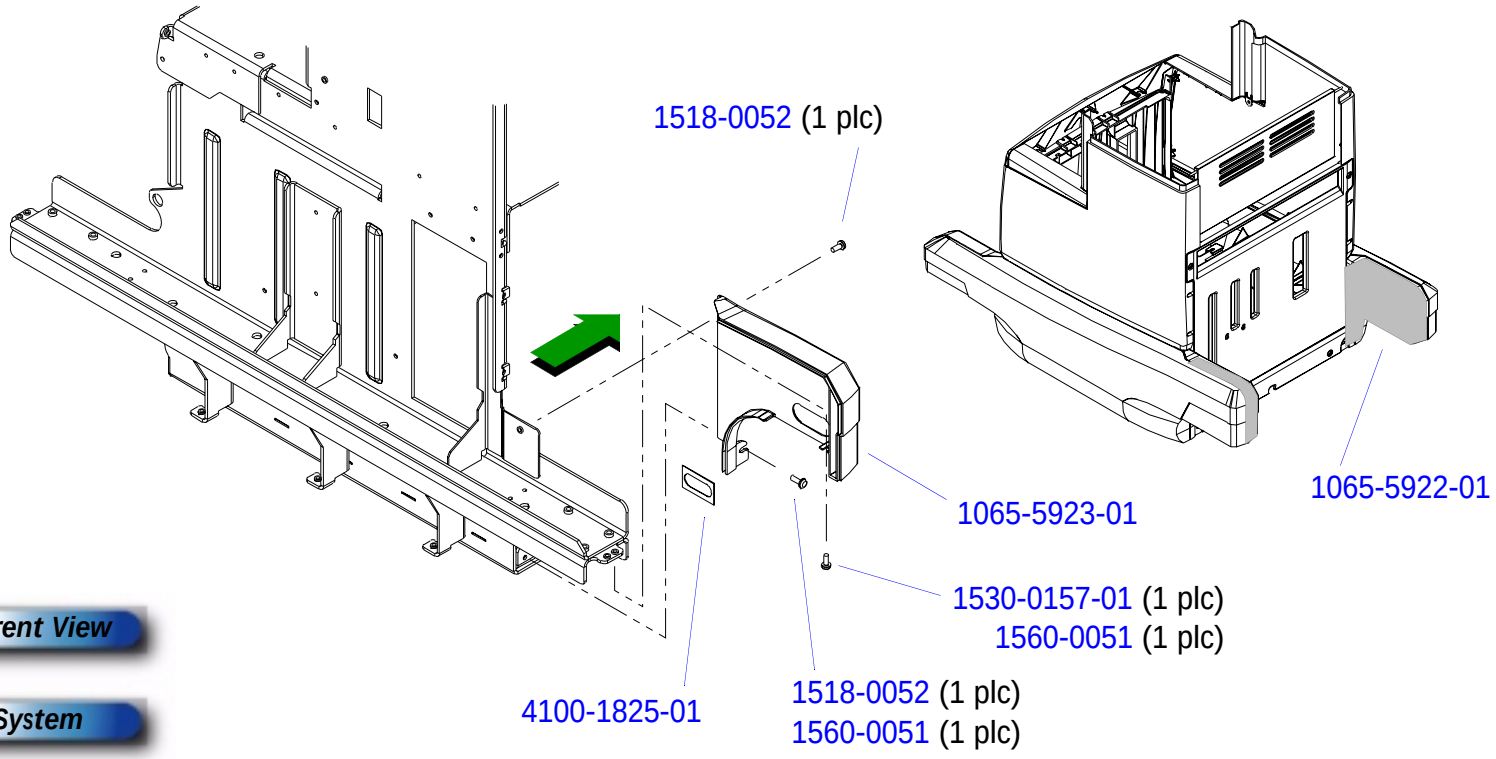


Parent View

System

Figure 12-82 Left/Right Rear Inner Bumper (Right Shown), Philips HDI 5000

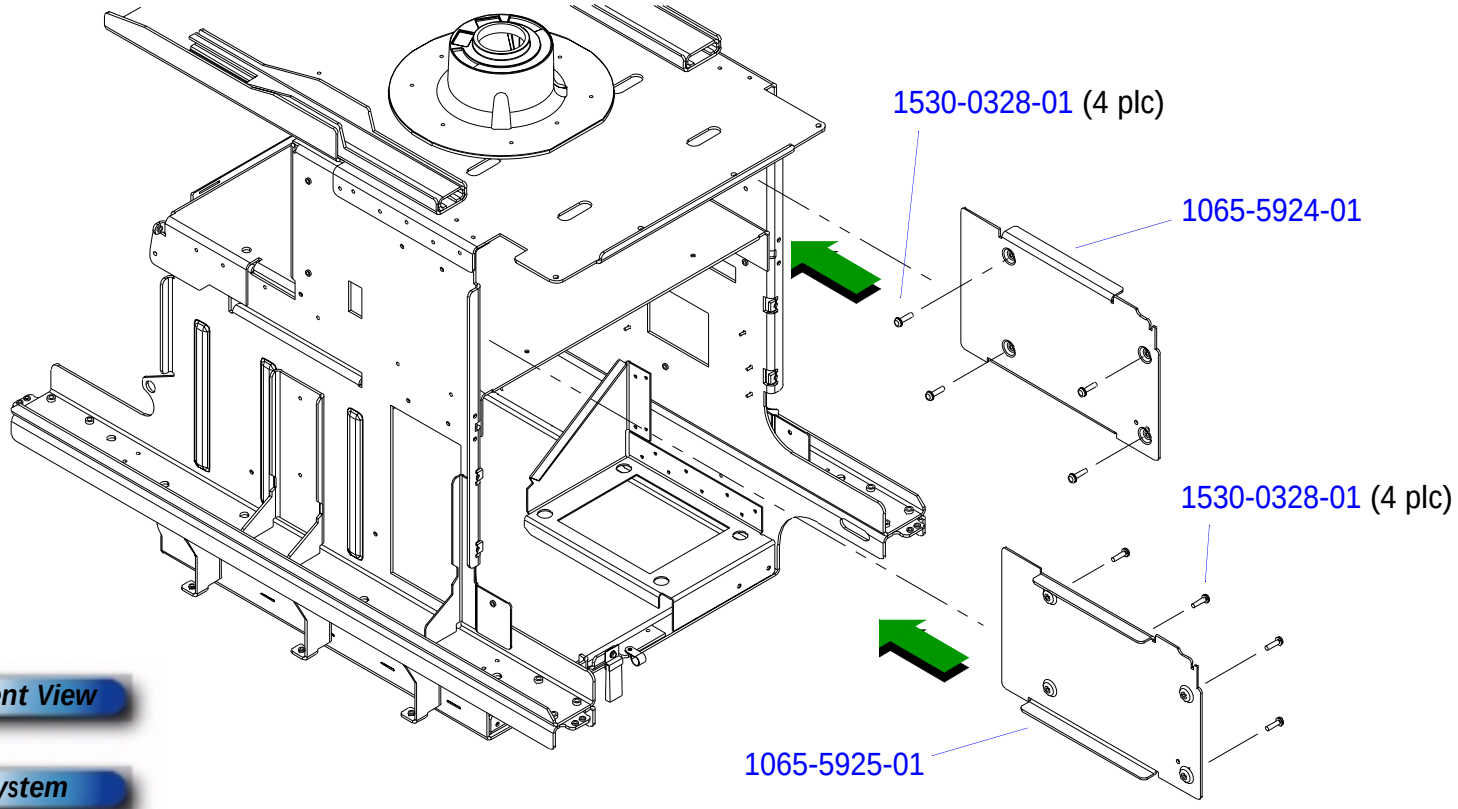
NOTE Left rear inner bumper installation is identical.



Parent View

System

Figure 12-83 Left/Right Inner Upright Cover, Philips HDI 5000

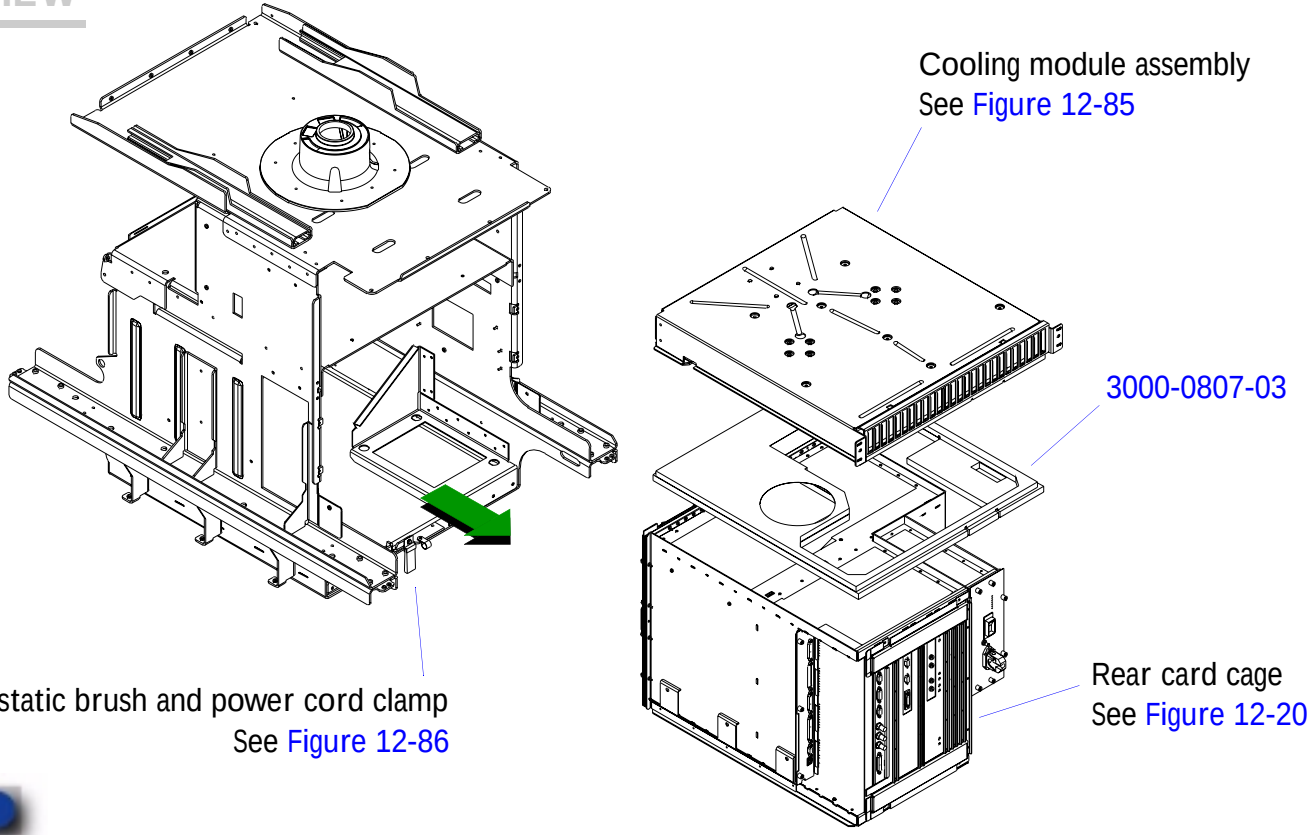


Parent View

System

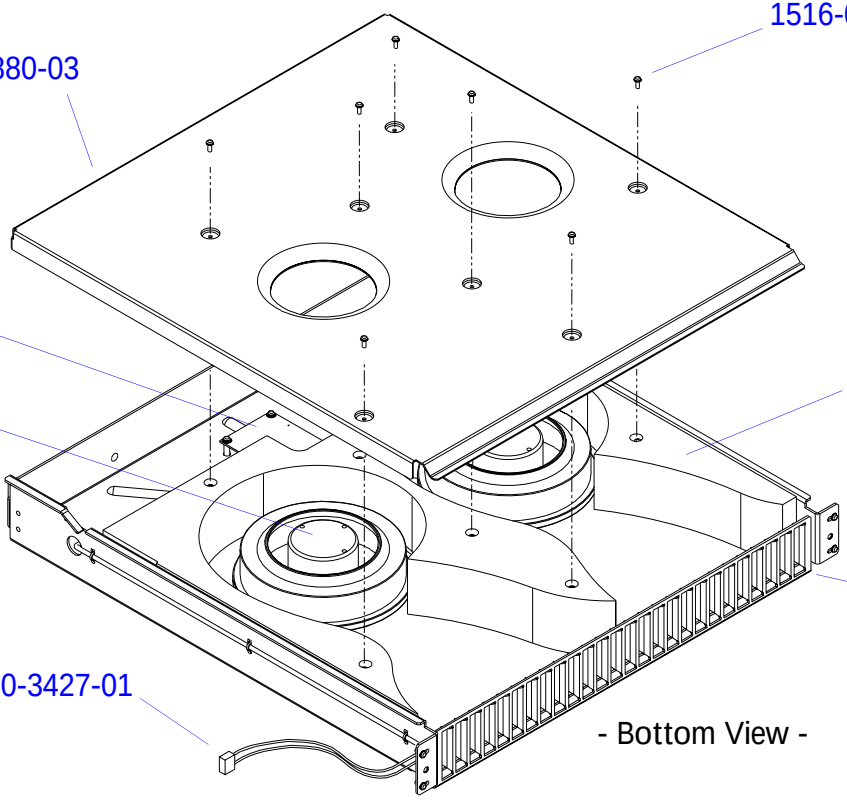
Figure 12-84 Rear Compartment, Philips HDI 5000

PARENT VIEW



System

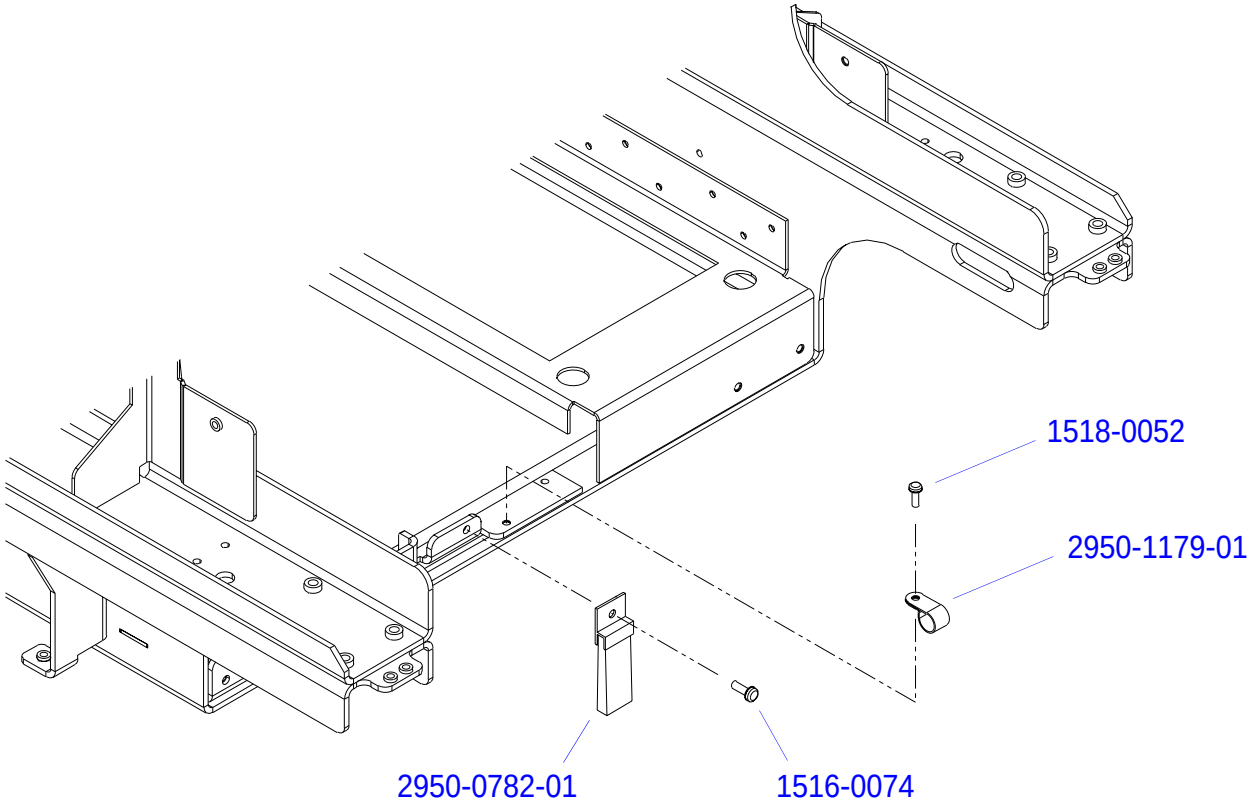
Figure 12-85 Cooling Module Assembly, Philips HDI 5000



Cooling module assembly
3500-3443-02

Parent View
System

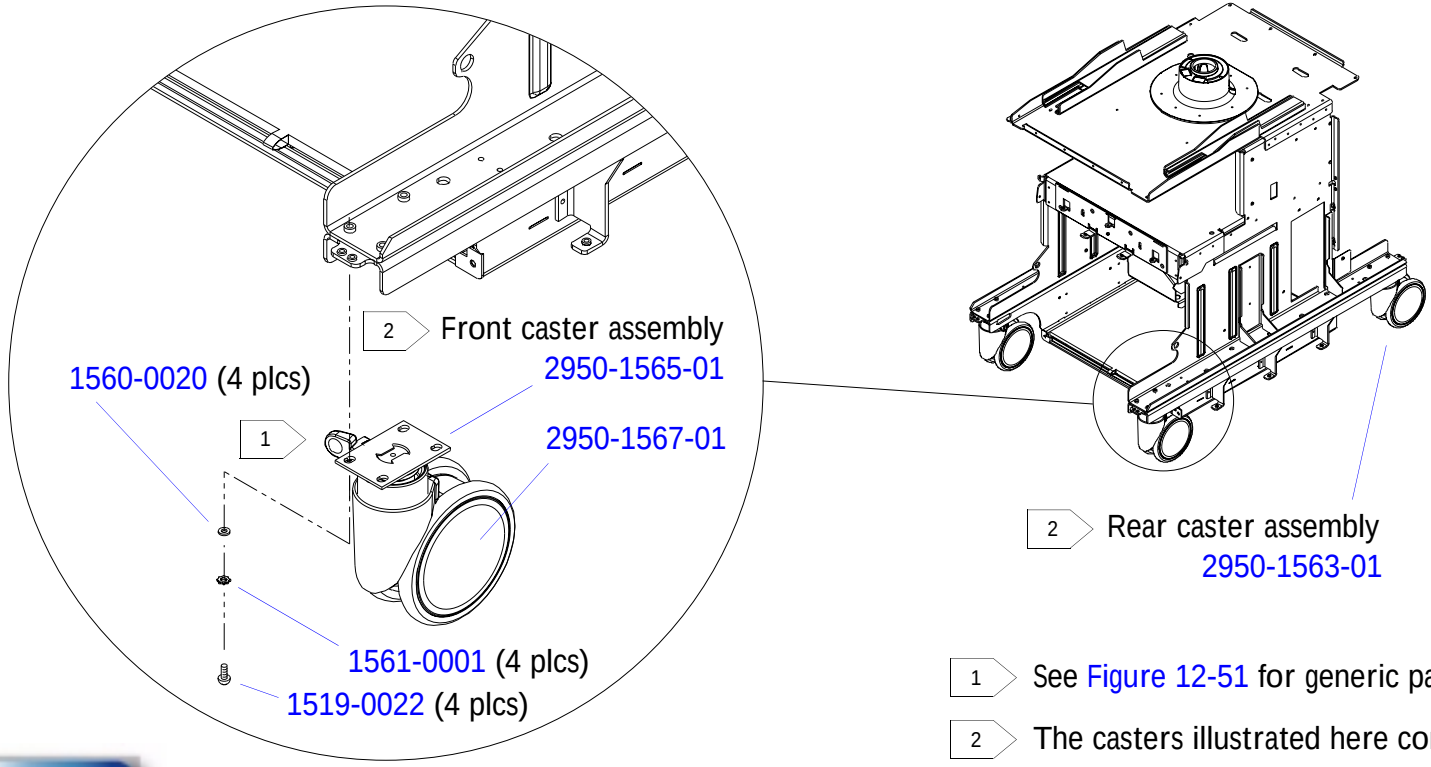
Figure 12-86 Antistatic Brush and Power Cord Clamp, Philips HDI 5000



Parent View

System

Figure 12-87 Caster Assemblies, Philips HDI 5000



1 See Figure 12-51 for generic parts.

2 The casters illustrated here come with hubcaps.

System

Parts List

Table 12-1 HDI 5000/Philips 5000 System Parts List

Located On	Part Number	Part Description	Notes/Reference
Figure 12-32	1065-2866-01	Adapter, Monitor Height	For older systems/system upgrades only. The new monitor collar on the cart weldment is taller and replaces this part.
Figure 12-34	2100-0843-01	Adapter, Serial Interface, RS-232	
Figure 12-11	1065-2381-01	Air Deflector, Card Cage	
Figure 12-11	1065-2732-02	Air Deflector, Card Cage, 4 Board Set	
Figure 12-6	2950-1148-01	Air Filter, Plastic	
Figure 12-63	3500-3423-03	Arm Assembly, Articulation	Philips HDI 5000 system
Figure 12-65	1065-5894-01	Arm, Lower	Philips HDI 5000 system
Figure 12-65	3000-0812-01	Arm, Lower, Assembly	Philips HDI 5000 system
Figure 12-64	1065-5891-03	Arm, Upper	Philips HDI 5000 system
Figure 12-64	3500-3510-01	Arm, Upper, Assembly	Philips HDI 5000 system
Figure 12-38	1065-5947-01	Bar, UIF Locking	New color Philips HDI 5000 system
Figure 12-32	3500-2812-03	Base Assembly, Tilt with Adapter	
Figure 12-64	3000-0810-01	Base Assembly, Yoke and Tilt	Philips HDI 5000 system
Figure 12-27	1065-1789-08	Base, HDI, Color Monitor	Use with 3500-2532-11 monitor
Figure 12-35	1065-4503-01	Base, Microphone Module	
Figure 12-60	1065-5906-01	Base, Monitor	Philips HDI 5000 system

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-27	1065-5131-02/-03	Base, Monitor, with Machined Studs	Use with 3500-2532-15/14, 3500-1589-01, and 3500-3040-01 monitors
Figure 12-64	1065-5895-01	Base, Tilt	Philips HDI 5000 system
Figure 12-32 Figure 12-33	1065-2682-03	Base, Tilt Mechanism, Fog	
Figure 12-28	1065-4345-02	Beam, Mounting, Rear, Monitor	
Figure 12-32	1065-2439-01	Bearing, Monitor Swivel	
Figure 12-61	3000-0814-01	Bezel Assembly, Monitor	Philips HDI 5000 system
Figure 12-12 Figure 12-13	1065-4681-01	Bezel, DDEA	
Figure 12-61	1065-5932-01	Bezel, Inner, Monitor	Philips HDI 5000 system
Figure 12-12 Figure 12-13	1065-6004-01	Bezel, MO Drive, DDEA, L10.5	New color Philips HDI 5000 system
Figure 12-61	1065-5904-01	Bezel, Monitor	Philips HDI 5000 system
Figure 12-30 Figure 12-31	1065-4317-02	Bezel, Monitor, 15-in, Color	
Figure 12-51 Figure 12-52 Figure 12-87	1519-0022	Bolt, 1/4-20 x 3/4, Hex, St, Zn	
Figure 12-23	1530-0145-01	Bolt, 1/4-20 x 4-1/2, Hex, St, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-24	2950-0513-01	Bracket, Capacitor	
Figure 12-17	1065-2997-01	Bracket, Connector, Disk Drive Module	
Figure 12-29	1065-4314-02	Bracket, Controls, Monitor, 15-in, Color	Use only with 1065-4691-01 cover
	1065-4314-03		Use only with 1065-4691-02 cover See kit 8000-1462-01
Figure 12-44	1065-3004-02	Bracket, Cord Wrap	
Figure 12-16	1065-5058-01	Bracket, Disk Drive, Optical	See kit 8000-1682-01
Figure 12-16	1065-2244-03		Alternate
Figure 12-21	1065-2365-03	Bracket, Fan Mount	Rear system four fan bracket HDI 5000 classic system
Figure 12-7	1065-2954-02	Bracket, Mounting, Front Cover	
Figure 12-18	1065-2255-05	Bracket, Mounting, Rear Cover	
Figure 12-24	1065-3019-02	Bracket, Mounting, Transformer	
Figure 12-46	1065-4626-03	Bracket, Remote D-SUB	
Figure 12-23	1065-2498-02	Bracket, Sinewave Xfmr	
Figure 12-19 Figure 12-76	1065-5623-01	Bracket, Stud, Transceiver	
Figure 12-76	1065-5622-01	Bracket, Transceiver Support	
Figure 12-19	1065-5971-01	Bracket, Transceiver Support, L10.5	New color, Philips HDI 5000 system
Not shown	1065-4980-01	Bracket, UIF, Ferrite	User interface

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-34	1065-1803-05	Bracket, VCR Mounting	
	1065-3021-01	Bracket, VCR Mounting, for Sony SVO-9500MD VCR	Hitachi systems
Figure 12-18 Figure 12-86	2950-0782-01	Brush, Antistatic	
Figure 12-30 Figure 12-62	3900-0032-01	Bulb, Light Bar, T2, GF710, 12V, 0.1A, 1/4-in D x 1-1/4-in L	
Figure 12-27 Figure 12-50 Figure 12-60	2950-0586-01	Bumper, 5DX.14H, Clr Vinyl, Adhesive Back	
Figure 12-4	1065-4695-01	Bumper Cap, Front, Left	
Figure 12-4	1065-4694-01	Bumper Cap, Front, Right	
Figure 12-4	1065-4704-01	Bumper Cap, Rear, Dark Gray	
Figure 12-43	1065-4637-02	Bumper, Handle, Self-Adhesive, Dark Gray	
Figure 12-43	1065-5280-01	Bumper, Handle with Clip Holes	
Figure 12-81	1065-5920-01	Bumper, Left Front, Inner	Philips HDI 5000 system
Figure 12-81	1065-5921-01	Bumper, Left Rear, Inner	Philips HDI 5000 system
Figure 12-82	1065-5922-01	Bumper, Right Front, Inner	Philips HDI 5000 system
Figure 12-82	1065-5923-01	Bumper, Right Rear, Inner	Philips HDI 5000 system

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-4	1065-4696-01	Bumper, Side Strap, Dark Gray	Requires adhesive
	1065-4705-03	Bumper, Side Strap, Dark Gray	Alternate
	3000-0681-02	Bumper, Side Strap, W/Extension	Extended cart
Figure 12-29	1065-5968-01	Button, Monitor Control	New color Philips HDI 5000 system
Figure 12-29	1065-4548-01	Button, Push, Monitor Control	
Figure 12-66	1065-5890-01	Button, Travel Lock	Philips HDI 5000 system
Figure 12-31	2208-0070	Cable Anchor, 3/4-in Sq, 70C, Adhesive Back	Secures 3500-2614-XX cable assy to bezel
Figure 12-45	3500-2721-02	Cable Clamp Assembly	
Figure 12-48	3500-1834-01	Cable Drape Assy	
Figure 12-69	1065-5899-01	Cable Hook, Right	Philips HDI 5000 system
Figure 12-69	1065-5900-01	Cable Hook, Left	Philips HDI 5000 system
Figure 10-40	Table 10-2	Cables, Power Distribution	
Figure 10-39	Table 10-1	Cables, Signal Interconnect	
Figure 12-17 Figure 12-23 Figure 12-31	2208-0003	Cable Tie, 3 7/8-in Long, Ny	Secures 3500-2614-XX cable assy to bezel
Figure 12-24	3700-0175-01	Cap, 30 µf, 660VAC 10%, Xfmr Res Paper	
Figure 12-65	1065-6072-01	Cap, Spring Plunger	Philips HDI 5000 system
Figure 12-52	2950-0658-04	Caster Assy, with Axle, Shock Absorbing	Rear Axle (Light Gray)

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-51	2950-0657-09	Caster Assy, Swivel/Brake, Shock Absorbing	Front (Light Gray)
Figure 12-51	2950-1278-04	Caster Assy, Swivel/Lock, without Brake, 6-inch Diameter	Rear (Light Gray)
Figure 12-51	2950-1388-02	Caster Assy, Swivel/Lock, without Brake, Bumper Gray	Rear (Dark Gray)
Figure 12-51	2950-1562-01	Caster Assy, Swivel/Lock, without Brake, Bumper Gray (Darcor)	Rear (Dark Gray) Comes with Darcor hubcaps
Figure 12-87	2950-1563-01	Caster Assy, Swivel/Lock, without Brake, Light Gray (Darcor)	Rear (Light gray), Philips HDI 5000 system, comes with Darcor hubcaps
Figure 12-51	2950-1389-02	Caster Assy, with Wheel Brake, Bumper Gray	Front (Dark Gray)
Figure 12-51	2950-1564-01	Caster Assy, with Wheel Brake, Bumper Gray (Darcor)	Philips HDI 5000 system, comes with Darcor hubcaps
Figure 12-87	2950-1565-01	Caster Assy, with Wheel Brake, Light Gray (Darcor)	Front (Light gray), Philips HDI 5000 system, comes with Darcor hubcaps
Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15	1065-5949-01	Chassis, DDEA, L10.5	New color, Philips HDI 5000 system
Not shown	2070-1188-01	Chip, SYSCPU ID, 6-Digit	Requires specific MO files to reflect the machine ID number
Not shown	2208-0198-01	Clamp, CA, 0.187ID, 0.218 Mtg Hole, ST	User interface

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Not shown	2208-0199-01	Clamp, CA, 0.25ID, 0.218 Mtg Hole, ST	User interface
Not shown	1065-4800-01	Clamp, Cable	User interface, See kit 8000-1668-01
Figure 12-19 Figure 12-86	2950-1179-01	Clamp, Cable, 3/8D, 1/2W, 1/4, Ins	
Figure 12-5	1065-2370-02	Clamp, Cable, IIM	
Figure 12-33	3000-0363-04	Clamp Lock Assy, Monitor	
Figure 12-17	3100-2383-01	Connector, Terminator, SCSI, Plug, 2x25	
Figure 12-70	3000-0808-01	Cover Assembly, Command Module	Philips HDI 5000 system
Figure 12-7	3500-2850-02	Cover Assy, Front	
Figure 12-19	3500-2851-02	Cover Assy, Rear	Contains the 1065-2892-03
Figure 12-19	3500-3056-02	Cover Assy, Rear, 10.2	Contains the 1065-2892-04
Figure 12-19	3500-1872-03	Cover Assy, Rear, 10.5	Contains the 1065-5704-02
Figure 12-5	1065-4685-03	Cover, Cable, Left	Non-CV systems
Figure 12-5	1065-4751-03	Cover, Cable, Left	CV systems
Figure 12-5	1065-4684-03	Cover, Cable, Right, Notched	Non-CV systems
Figure 12-5	1065-4750-03	Cover, Cable, Right, Notched	CV systems
Figure 12-38	1065-4260-02	Cover, Command Module	
Figure 12-70	1065-5886-01	Cover, Command Module	Philips HDI 5000 system

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15	1065-1947-03	Cover, Disk Drive Module	
Figure 12-74	1065-5909-01	Cover, Front	Philips HDI 5000 system
Figure 12-74	3500-3425-01	Cover, Front, Assembly, L10.5	Philips HDI 5000 system
Figure 12-7	1065-2882-03	Cover, Front Enclosure	
Figure 12-83	1065-5924-01	Cover, Inner Upright, Left	Philips HDI 5000 system
Figure 12-83	1065-5925-01	Cover, Inner Upright, Right	Philips HDI 5000 system
Figure 12-79	1065-5911-01	Cover, Lower Left Side	Philips HDI 5000 system
Figure 12-79	1065-5913-01	Cover, Lower Right Side	Philips HDI 5000 system
Figure 12-75	3500-3446-01	Cover, Rear, Assembly, L10.5	Philips HDI 5000 system
Figure 12-80	1065-5912-01	Cover, Upper Left Side	Philips HDI 5000 system
Figure 12-80	1065-5914-01	Cover, Upper Right Side	Philips HDI 5000 system
Figure 12-35	1065-4504-01	Cover, Microphone Module	
Figure 12-60	1065-5907-01	Cover Monitor	Philips HDI 5000 system
Figure 12-27	1065-4691-02	Cover, Monitor, 15-in Color	Without rear panel cover, use with 1065-4314-03 controls bracket, See kit 8000-1462-01
	1065-4691-01	Cover, Monitor, 15-in Color	With rear panel cover, use with 1065-4314-02 controls bracket

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-19	1065-2892-03	Cover, Rear Enclosure	Part of 3500-2851-02
Figure 12-19	1065-2892-04	Cover, Rear Enclosure	Part of 3500-3056-02
Figure 12-19	1065-5704-02	Cover, Rear Enclosure	Part of 3500-1872-03
Figure 12-81 Figure 12-82	4100-1825-01	Cover, Slot, Brake Lever	Adhesive back label Philips HDI 5000 system
Figure 12-30	1065-4233-03	Diffuser, Light, Monitor	
Figure 12-62	1065-5908-01	Diffuser, Light, Monitor	Philips HDI 5000 system
Figure 12-14	2100-1445-01	Disk Drive, Hard, 3.5-in, 2.1-GB, SCSI Intfc	
Figure 12-12 Figure 12-15	2100-1517-01	Disk Drive, Hard, 3.5-in, 3.2-GB, SCSI-3, Intfc	
Figure 12-15	2100-1324-01	Disk Drive, Hard, 3.5-in, 1280-MB, SCSI Intfc	
Figure 12-13	3500-2845-01	Disk Drive, Hard, 3.5-in, SCSI, formatted	Pre-loaded software

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Not shown	Call your Philips representative for the part number and compatible software version of system PCBs and drives.	Disk Drive Module (DDEA), A1F	
Not shown		Disk Drive Module Assy, Generic, ECG, 10.5.1	Philips HDI 5000 system.
Not shown		Disk Drive Module Assy, Physio, ECG (color change)	Philips HDI 5000 system.
Figure 12-13		Disk Drive Module Assy, Physio	
Figure 12-13		Disk Drive Module Assy, Physio	
Figure 12-14		Disk Drive Module Assy, Physio, No MO	
Figure 12-12		Disk Drive Module Assy, without ECG	
Figure 12-15		Disk Drive Module Assy, without ECG or MO Drive	
Figure 12-16		Disk Drive, Optical, 3.5-in, 640-MB	See kits 2100-1419-01 and 8000-1682-01.
Figure 12-85	2100-1864-01	Fan, 12-28VDC, 141CFM, 6.9-inch RND	Impeller Type Philips HDI 5000 system
Figure 12-21	2100-0856-01	Fan, 24 Vdc, 120 CFM, 4.7-in Square TB, w/6-32	
	2100-0839-01	Fan, 24 Vdc, 120 CFM, 4.7-in Square UL/CSA	Alternate
Figure 12-85	3500-3428-01	Fan Assembly	Philips HDI 5000 system
Figure 12-43	1065-5290-02	Fastener, Clip, Nylon, 0.250-inch	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-22	3402-0026-01	Filter, Power, Line, 15A, 250V, Pnl Mt	
Figure 12-4 Figure 12-7	1065-2973-01	Foam, Bottom, Footswitch Tray	
Figure 12-74	1065-5910-01	Footrest	Philips HDI 5000 system
Figure 12-53	3300-0344-01	Footswitch, 2-Stage, with Cable and Plug	
Figure 12-53	3500-1461-02	Footswitch, Assy, with Plate	
Figure 12-53	3300-0312-01	Footswitch, Triple, with Base and Cable Assembly	
Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15	3600-0246-01	Gasket, RFI, Finger Clip, BE-CU, 2.5-in	
Figure 12-16	2275-0234-01	Ground Strap, Insul, 6.01 x 0.5W	
Figure 12-10	1065-1991-02	Guide, Card	Do not install card guides in empty slots (PS1,PS3,A2F,PS5, A7B,A10B)
Figure 12-10	2950-0606-01	Guide, Card, 2.5-in L,.2 Deep, Snap-in	
Figure 12-25	2950-1236-01	Handle, 3.0LX, 0.5W, 0.87T, Int 8-32, AL, Anodz	
Figure 12-69	3000-0806-01	Handle Assembly, Cart	Philips HDI 5000 system
Figure 12-69	1065-5869-01	Handle, Cast, Bottom	Philips HDI 5000 system

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-69	1065-5870-01	Handle, Cast, Top	Philips HDI 5000 system
Figure 12-43	1065-4592-01	Handle Casting	
Figure 12-43	1065-4592-02	Handle Casting	
Figure 12-17	2950-1039-01	Handle, MO Drive Cover Plate, DDEA	
Figure 12-35	2950-1155-01	Holder, Microphone	
Figure 12-85	1065-5879-03	Housing, Air Plenum	Philips HDI 5000 system
Figure 12-65	1065-6073-01	Housing, Spring Plunger	Philips HDI 5000 system
Figure 12-51	2950-1447-01	Hubcap, Caster, Bumper Gray	Front and Rear, 2 each caster
Figure 12-51	2950-0818-02	Hubcap, Front, Caster Assy	2 each caster
Figure 12-52		Hubcap, Rear, Axle Assy	1 each side
Figure 12-51	2950-1568-01	Hubcap, 6” wheel, steel, bumper gray	2 each Darcor caster
Figure 12-87	2950-1567-01	Hubcap, 6” wheel, steel, light gray	Philips HDI 5000 system 2 each Darcor caster
Figure 12-4	1563-0345-01	Insert, 8/32, Wellnut, 0.015-0.156 Grip	
Figure 12-85	1065-5881-03	Insert, Fan, Cooling	Philips HDI 5000 system
Figure 12-35	1065-4671-01	Insert, Foam, Forward, Mic Module	
Figure 12-16	2950-1164-01	Isolator, 3.1Lb Min, 5 Lb Max Load	
Figure 12-31	1065-4501-01	Isolator, Speaker, Monitor	
Figure 12-23	2950-0613-01	Isolator, Vibration, Xfmr	
Figure 12-42	4400-0092-02	Keycap Set, English	Use on 3500-2636-XX keyboard
Figure 12-51	1065-2611-02	Knob, Brake Lever	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-12	9903-0338-02	Label, 1.0 x 0.5, Plystr, Wht, Ammo-pak	Behind panel
Figure 12-13 Figure 12-14 Figure 12-15 Figure 12-54 Figure 12-56	4100-0299	Label, 2D/TM, 4000B, Footswitch	
Figure 12-56	4100-0942-02	Label, ACIM Voltage, 100-120V/60-Hz	
	4100-0943-02	Label, ACIM Voltage, 100-120V/50-Hz	
	4100-0944-02	Label, ACIM Voltage, 230-240V/50-Hz, 7.5A	
	4100-0945-02	Label, ACIM Voltage, 230V/60 Hz, 7.5A	
Figure 12-56	4100-1255-01	Label, ADAPTR	
	4100-1816-01		Philips HDI 5000 system
Not shown	4100-1811-01	Label, APM Remote	Philips HDI 5000 system
Not shown	4100-1821-01	Label, Blanking, Scanhead Select	Philips HDI 5000 system
Figure 12-55	4100-0993-01	Label, Caution, PCB Removal	
Figure 12-56	4100-1531-02	Label, Chinese ID	
Figure 12-56	4100-1256-01	Label, CPU	
	4100-1817-01		Philips HDI 5000 system
Figure 12-54	9903-0538-01	Label, DHHS Radiation Compliance, 1-7/8 x 5/8-in, Domestic systems only	
Figure 12-56	4100-0757-01	Label, Footswitch, Water-resistant	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-55	4100-1399-01	Label, Frame OEM Upright, Dark Grey	
Figure 12-56	4100-0296	Label, Freeze Frame, 4000B, Footswitch	
Figure 12-56	4100-0968-01	Label, Ground and AC Input	
Figure 12-54	4100-1041-01	Label, Latching Monitor, Right-Hand	
Figure 12-54	4100-1042-01	Label, Latching Monitor, Left-Hand	
Figure 12-54	4100-1607-01	Label, Microphone Symbol	Behind panel
	4100-1813-01		Behind panel, Philips HDI 5000 system
Figure 12-54	4100-1431-01	Label, MISEM Connector, Remote	
Figure 12-55	4100-0958-01	Label, OEM Baseplate	
	4100-1820-01		Philips HDI 5000 system
Figure 12-56	4100-1433-01	Label, PCB Slot ID	Located inside of front cover, outside of rear cover
	4100-1433-02	Label, PCB Slot ID, 170.XX systems and above	
Figure 12-56	4100-0961-02	Label, PIM	
	4100-1815-01		Philips HDI 5000 system
Figure 12-54	4100-0960-01	Label, Power Input, Monitor	
	4100-1812-01		Philips HDI 5000 system
Figure 12-55	4100-1238-01	Label, Right Side Cover	Alternate to 4100-1399-01

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-54	4100-0966-02	Label, System ID	
	4100-1807-01	Label, System ID, CV	Philips HDI 5000 system
	4100-1806-01	Label, System ID, General Imaging	Philips HDI 5000 system
	4100-1808-01	Label, System ID, Sono CT	Philips HDI 5000 system
Figure 12-54	4100-0959-01	Label, System Standby-On	
	4100-1809-01		Philips HDI 5000 system
Figure 12-56	4100-0297	Label, VCR, 4000B, Footswitch	
Figure 12-54	4100-1393-01	Label, Warning, High Voltage	
	4100-1814-01		Philips HDI 5000 system
Figure 12-54	4100-1260-01	Label, Warning, Monitor Latch	
	4100-1819-01		Philips HDI 5000 system
Figure 12-54	4100-1568-01	Label, Warning, Monitor Lock	
	4100-1810-01		Philips HDI 5000 system
Figure 12-56	4100-1387-01	Label, Warning, Power Cord	
	4100-1818-01		Philips HDI 5000 system
Figure 12-38	1065-4264-02	Latch, Lock Bar	
Figure 12-28	2405-0124-01	LED, Green, T1, 4MCD, Clear, PCB	
Figure 12-28	2950-1161-01	Lens, LED, 3MM, Green, Low Profile	
Figure 12-38	1065-4263-01	Lock Bar, Control Panel	
Figure 12-35	2100-1403-01	Microphone Cartridge, Cond., Electret	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-35	3500-2631-02 3500-2631-03	Microphone Module Assy	Turtle style -03 is used for FIMI monitor
Figure 12-59	2100-1868-01	Microphone, Monitor Mounted	Labtec Compatible with both HDI 5000 and Philips HDI 5000 system monitors
Figure 12-70	1065-5885-01	Midwall, Command Module Cover	Philips HDI 5000 system
Figure 12-85	3500-3443-02	Module, Cooling, L10.5	Philips HDI 5000 system
Figure 12-28	2100-1346-08 2100-1346-09 2100-1471-01 2100-1589-03 2100-1589-04	Monitor, 15-inch, Color, Open Chassis	Use 2100-1346-08 with 3500-2532-11 monitor assy, 2100-1346-09 with 3500-2532-14, 2100-1471-01 with 3500-2971-01, and 2100-1589-01 with 3500-3040-01
Figure 12-59	3500-3434-01	Monitor Assembly, 15-inch, with Handle	Philips HDI 5000 system
Figure 12-52	1544-0012	Nut, 1/4-20, Keps, St, Zn	
Figure 12-16	1539-0003	Nut, 4-40, Keps, St, Zn	
Figure 12-5 Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15 Figure 12-16	1541-0002	Nut, 6-32, Keps, St, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-32 Figure 12-24 Figure 12-45	1543-0002	Nut, 10-32, Keps, St, Zn	
Figure 12-24	2601-0071-01	OEM Power Transformer, 350VA, 1 Pri/ 2Sec, Shielded	
Figure 12-25 Figure 12-50 Figure 12-71	1065-2386-01	OEM Strap, Universal	
Not shown	4100-1764-01 4100-1765-01 4100-1766-01 4100-1767-01	Overlay, Upper UIF	English, French, German, Italian (10.4 systems)
Not shown	4100-1802-01 4100-1803-01 4100-1804-01 4100-1805-01	Overlay, Upper UIF, L10.5	English, French, German, Italian (Philips HDI 5000 system)
Figure 12-69	1065-5940-02	Overmold, Palm Rest (Wrist Support)	Philips HDI 5000 system
Figure 12-4	1065-4638-01	Pad, Foot Rest, Dark Gray	Requires adhesive
Figure 12-5	1065-2254-04	Panel, IIM Access	
Figure 12-29	1065-5967-01	Panel, Monitor Control, L10.5	New color Philips HDI 5000 system
Figure 12-27	1065-4676-01	Panel, Monitor Cover	Use with 1065-4691-01 cover

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15	1065-1946-05	Panel, Mounting, Disk Drive Module	
Figure 12-75	1065-5916-01	Panel, Rear	Philips HDI 5000 system
Figure 12-18	1065-4945-01	Panel, Rear, Dark Gray	
Figure 12-75	1065-5944-01	Panel, Rear Opening	Philips HDI 5000 system
Figure 12-77	1065-5917-01	Panel, Shield, Front Section	Philips HDI 5000 system
Figure 12-78	1065-5918-01	Panel, Shield, Left Section	Philips HDI 5000 system
Figure 12-78	1065-5919-01	Panel, Shield, Right Section	Philips HDI 5000 system

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-20	Call your Philips representative for the part number and compatible software version of system PCBs.	PCB Assy, Adv. Digital/Audio/ Physio and Translator (ADAPTR), A9B	
Figure 12-20		PCB Assy, Adv. IF Output Module (AIFOM), A12B or A12B/A13B	
Figure 12-22		PCB Assy, AC Input Module (ACIM), PS4/ PS5, All voltage and freq. configurations	
Figure 12-9		PCB Assy, Centerplane, Front	
Figure 12-9		PCB Assy, Centerplane, Rear	
Figure 12-9		PCB Assy, Channel Board	
Figure 12-9		PCB Assy, Channel Boards (CB0-CB7), A7F-A14F	
Figure 12-13 Figure 12-14		PCB Assy, Disk Drive Module, with Physio	
Figure 12-12 Figure 12-15		PCB Assy, Disk Drive Module, without ECG	
Figure 12-85	7500-1973-01	PCB Assy, Fan Limiter	Philips HDI 5000 system
Figure 12-9	Call your Philips representative for the part number and compatible software version of system PCBs.	PCB Assy, Front End Controller (FEC), A4F	
Figure 12-20		PCB Assy, Image Memory (IMEM), A8B, 64-Mb	16 Mb x 4 SIMMS
Figure 12-20		PCB Assy, Internal Interface Module (IIM), A1B	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-29	7500-1312-02 7500-1582-01 7500-1667-05 7500-1964-01	PCB Assy, Monitor Control	Use 7500-1312 for 3500-2532-XX monitor, 7500-1667 for 3500-3040-XX, and 7500-1582 for 3500-2971-XX
Figure 12-30 Figure 12-62	7500-1313-02	PCB Assy, Monitor Light Bar	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-20	Call your Philips representative for the part number and compatible software version of system PCBs.	PCB Assy, Peripheral Interface Module (PIM), A2B	
Figure 12-20		PCB Assy, Pixel Conversion Module (PCM), A3B	
Figure 12-20		PCB Assy, Pixel Space Processor 2 (PSP2), A4B	
Figure 12-20		PCB Assy, Pixel Space Processor 1 (PSP1), A5B	
Figure 12-9		PCB Assy, Power Supply Module (PSM), PS1	
Figure 12-9		PCB Assy, Regulator Module A6F	
Figure 12-9		PCB Assy, Scanhead Select, L10.5	Philips HDI 5000 system,
Figure 12-20		PCB Assy, Signal Processor Module SPM2X, A11B	
Figure 12-20		PCB Assy, Signal Processor Module (SPM), A11B	
Figure 12-20		PCB Assy, System CPU, A6B,	
Figure 12-41		PCB Assy, User Interface Module	
Figure 12-65	1065-6071-01	Pin, Spring Plunger	Philips HDI 5000 system
Figure 12-85	1065-5880-03	Plate, Air Inlet	Philips HDI 5000 system
Figure 12-45	1065-2576-02	Plate, Cable Clamp, Left	
Figure 12-45	1065-2577-02	Plate, Cable Clamp, Right	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-17	1065-2951-02	Plate, Cover, OD Drive, DDEA	
Figure 12-74	1065-5945-01	Plate, Footrest, Front Backing	Philips HDI 5000 system
Figure 12-74	1065-5946-01	Plate, Footrest, Rear Backing	Philips HDI 5000 system
Figure 12-53	1065-2153-01	Plate, Footswitch	
Figure 12-65	1065-5887-01	Plate, Lower Arm	Philips HDI 5000 system
Figure 12-32	1065-2372-04	Plate, Monitor Swivel	
Figure 12-65	3000-0809-01	Plate, Mount, Lower Arm Assembly	Philips HDI 5000 system
Figure 12-24	1065-2533-02	Plate, Stud, Sinewave Transformer	
Figure 12-25	1065-2385-04	Plate, Universal OEM	
Figure 12-25	1065-5972-01	Plate, Universal OEM, L10.5	New color Philips HDI 5000 system
Figure 12-65	1065-5893-01	Plate, Upper Arm Mount	Philips HDI 5000 system
Figure 12-27	2950-0587-01	Plug, Hole, 0.562D, 1/8 Max, Pnl, Wht, Nylon	Without VCR
Figure 12-27	2950-1377-01	Plug, Hole, 0.5Dia, 0.67Head Dia, Nyl Nat	
Figure 12-12 Figure 12-15	2950-1041-01	Plug, Hole, ECG, Painted	
Figure 12-12 Figure 12-15	2950-1040-01	Plug, Hole, Physio, DDEA, Painted	
Figure 12-22	2208-0143-01	Plug Lock, Inside, Detach Power Cord	For 3100-2148-01
Figure 12-22	2208-0144-01	Plug Lock, Outside, Detach Power Cord	For 3402-0026-01

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-23	2601-0052-06	Power Transformer Assy, Ferro-Res, 1200 VA, w/Shld	50-60 Hz
Figure 12-22	3100-2148-01	Receptacle, IEC, Male, 10A, Pnl/PCB	
Figure 12-65	1065-5626-02	Retainer, Lower Bearing	Philips HDI 5000 system
Figure 12-66	1065-6086-01	Retainer, Spring	Philips HDI 5000 system
Figure 12-32	1065-2438-01	Ring, Clamping, Monitor Swivel	
Figure 12-32	1065-4584-02	Rod, Spacer, Monitor Installation	For older systems/system upgrades only. The new monitor collar on the cart weldment is taller and replaces this part.
Figure 12-48	1065-2899-01	Rotor, Cable Manager	
Figure 12-65	1530-0384-01	Screw, 1/4 - 20x1/2, Skt, Cap, Ft, Hd, Ss	Philips HDI 5000 system
Figure 12-41	1514-0083	Screw, 4-40 x 1/4, Pnh, Sems, Pd, Ss	Attaches user interface PCB assy
Figure 12-46	1530-0027-01	Screw, 4-40 x 1/2, Flh, Pd, 82D, St, Wht	
Figure 12-66	1530-0386-01	Screw, 4-40 x 3/8, Pnh, Pd, Nylok, St, Zn	
Figure 12-16 Figure 12-17	1514-0060	Screw, 4-40 x 3/8, Pnh, Sem, Pd, St, Zn	
Figure 12-64 Figure 12-65	1530-0385-01	Screw, 5/16 - 24x1.25, Bh, Hd, Astm F835	Philips HDI 5000 system
Figure 12-62	1530-0336-01	Screw, 6-32 x 1/4, Flh, 100D, Pd, Nylk, Stzn	
Figure 12-65	1530-0383-01	Screw, 6-32 x 1/4, Set, Skt, Cone, St, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-21 Figure 12-24 Figure 12-29 Figure 12-30 Figure 12-85 Figure 12-86	1516-0074	Screw, 6-32 x 3/8, Pnh, Sem, Pd, St, Zn	
Figure 12-17	1530-0269-01	Screw, 6-32 x 1/2, Flh, Pd, 100D, Ss, Fogwhite	
Figure 12-5 Figure 12-6 Figure 12-7 Figure 12-30 Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15 Figure 12-48 Figure 12-62 Figure 12-69	1516-0113	Screw, 6-32 x 1/2, Pnh, Sem, Pd, St, Zn	
Figure 12-16	1516-0076	Screw, 6-32 x 5/16, Pnh, Int Sems, Pd, Ss	
Figure 12-48	1530-0058-01	Screw, 6-32 x 7/16, Pnh, Nylok, Pd, Ss	
Figure 12-31	1530-0327-01	Screw, 6-32 x 3/4, Pnh, Pd, Nylock, St, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-9	1563-2863-01	Screw, 6-32 x 1, Captive, HD, St, Zn	Attaches scanhead select module (14 places)
Figure 12-69	1516-0119	Screw, 6-32 x 1-1/2, Pnh, Sem, Pd, St, Zn	
Figure 12-25 Figure 12-44	1517-0040	Screw, 8-32 x 3/8, Pnh, Sems, Pd, St, Zn	
Figure 12-51	1530-0360-01	Screw, 8-32 x 3/8, Set, Hd, Flat, Pt, Zn	Requires a 5/64-in Allen wrench
Figure 12-4	1517-0012	Screw, 8-32 x 1, Pnh, Pd, St, Zn	
Figure 12-73 Figure 12-83	1530-0328-01	Screw, 10-32 x 1/4, Pnh, Pd, Sems, St, Zn	
Figure 12-25	1518-0060	Screw, 10-32 x 1/2, Pnh, Pd, St, Wht	
Figure 12-4 Figure 12-37 Figure 12-65 Figure 12-68 Figure 12-70	1518-0051	Screw, 10-32 x 1/2, Pnh, Sem, Pd, St, Zn	
Figure 12-51	1530-0347-01	Screw, 10-32 x 1/2, Skh, Cap, Hd, Nylok, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-73 Figure 12-75 Figure 12-77 Figure 12-78 Figure 12-80 Figure 12-81 Figure 12-82 Figure 12-86	1518-0052	Screw, 10-32 x 5/8, Pnh, Sem, Pd, St, Zn	
Figure 12-79 Figure 12-81 Figure 12-82	1530-0157-01	Screw, 10-32 x 5/8, Skh, Cap, Hd, Nylok, Zn	
Figure 12-6 Figure 12-19 Figure 12-74 Figure 12-80 Figure 12-81	1518-0043	Screw, 10-32 x 3/4, Pnh, Pd, St, Zn	
Figure 12-45	1530-0156-01	Screw, 10-32 x 1, Flh, Pd, Fog White	
Figure 12-32	1530-0297-01	Screw, 10-32 x 1, Pnh, Pd, Sems, St, Zn	
Figure 12-29	1630-0090-01	Screw, M4 x 6, Pnh, Pd, Int Sems, Ss, Bo	See kit 8000-1462-01
Figure 12-34	1630-0058-01	Screw, M4 x 10, Pnh, Pd, Sems S/R Lk, St, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-27 Figure 12-34 Figure 12-60	1630-0098-01	Screw, M5 x 12, Pnh, Pd, Int Sems, St, Bo	
Figure 12-12 Figure 12-13 Figure 12-14 Figure 12-15 Figure 12-46	3100-1387-01	Screwlock, 0.18-25H, 0.31L Stud, Pair	
Figure 12-84	3000-0807-03	Seal Assembly, Foam, Cooling	Comprises parts 1065-5882-03, 1065-5883-03, and 1065-5884-03. Comes assembled from vendor. Philips HDI 5000 system
Figure 12-16	1065-4682-01	Seal, Support, MO Drive, DDEA	
Figure 12-64 Figure 12-65	1065-5892-01	Shaft, Yoke Bearing	Philips HDI 5000 system
Figure 12-6	3500-1877-01	Shield Assy, Card Cage, Front Left	
Figure 12-6	3500-1876-01	Shield Assy, Card Cage, Front Right	
Figure 12-18	3500-1878-04	Shield Assy, Card Cage, Rear	
Figure 12-43	3600-0283-01	Shield, Strip, Finger, 0.34W, 0.07H	Part of 2950-1179-01, Figure 12-19
Figure 12-16	3600-0242-01	Shield, Strip, Finger, 1.13x4.0L	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-13 Figure 12-14	1064-0130-01	Spacer, Connector, Plastic	
Not shown	1065-4199-01	Spacer/Shield, Centerplane	
Not shown	1065-2986-02	Spacer/Shield, Centerplane (170.XX systems)	
Figure 12-31	2100-1235-01	Speaker, 3.5-in, 8-Ohm, SHLD, 8W, Ex, Rng	
Figure 12-66	2950-1587-01	Spring, Comp, .21D, .75L, 3.3LBF/In, Mw	Philips HDI 5000 system
Figure 12-65	2950-1586-01	Spring, Comp, .24D, .75L, 1.9LBF/In, Mw	Philips HDI 5000 system
Figure 12-48	2950-0856-01	Spring, Comp, .42 OD, 1.5L,K=8.75,Ss	
Figure 12-29	4600-0113-01	Standoff, 6-32,1.0L, 1/4 Hex, F/F, AL	See kit 8000-1462-01
Figure 12-29	4600-0271-01	Standoff, 6-32,1.0L, 1/4 Hex, F/F, Nylon	See kit 8000-1462-01
Figure 12-48	4600-0237-01	Standoff, 6-32, 2.5L, 5/16 Rnd, F-F, Ss	
Figure 12-65	4600-0297-01	Standoff, 10-32, 0.125L, 1/4RND, F/F, NY	Philips HDI 5000 system
Figure 12-28 Figure 12-34	2208-0147-01	Standoff, Wire, 3/16, Push-in, Twist, Ny	
Figure 12-48	1065-2901-01	Support, Cable Manager	
Figure 12-34	1065-2683-01	Support, VCR	
Figure 12-40	3300-0307-01	Switch, Rocker, Spst, 1A, 28V, Blk/Blk, Pnl	
Not shown	2604-0119-01	Tape, Velcro, 1-in W, Blk, Type 400, 3/4-in L	Secures ferrite core on 3500-2614-XX cable assy to monitor
Figure 12-23	2950-0512-01	Terminal Boot, Cap Insulator, Rubber	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-42	2100-1480-01	Trackball, 480C/Rev, 2-in, Sealed, Pnl	
Figure 12-42	2100-1480-02	Trackball, 480C/Rev, 2-in, Sealed, Pnlmt	
Figure 12-42	2100-1867-01	Trackball, 480C/Rev, 2-in, Sealed, Pnlmt	Philips HDI 5000 system
Figure 12-7	1065-2953-01	Tray, Enclosure	
Figure 12-49	2100-1743-01	Tray, OEM, Mitsubishi, CP700/CP800	Mounts to Universal OEM Plate
Figure 12-50	2100-1537-01	Tray, Paper Catch, Clr, Printer, CP800	Catch Tray comes supplied with four felt pads for the printer feet.
Figure 12-39 Figure 12-41	Call your Philips representative for the part number and compatible software version of this assembly.	User Interface Assy, Upper (UCP)	
Figure 12-39 Figure 12-42		User Interface Assy, Lower (LCP)	
Figure 12-35	9901-0035	Velcro, Hook & Loop, Wht.1-in Wd	
Figure 12-26	3500-2971-01	Video Monitor Assy, HDI 15-in	
	3500-3040-05/04	Video Monitor Assy, HDI 15-in Color, (FIMI)	Alternate to -06
	3500-3040-07/06	Video Monitor Assy, HDI 15-in Color, (FIMI)	
	3500-2532-11	Video Monitor Assy, HDI 15-in Color, (Microvitek)	Alternate to -15/16

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
	3500-2532-15/-16	Video Monitor Assy, HDI 15-in Color, (Microvitek)	
Figure 12-65	1561-0032	Washer, Ext Lock, #10, .410OD, .025T, St, Zn	
Figure 12-4 Figure 12-31 Figure 12-44 Figure 12-48	1560-0050	Washer, Flat, 0.17ID, 0.438OD, 0.032T, St, Zn	
Figure 12-16 Figure 12-41	1560-0065	Washer, Flat, #4, 0.122ID, 0.28OD, 0.03T,	Attaches user interface PCB assy
Not shown	1560-0031	Washer, Flat, #6, 0.156ID, 0.38OD, 0.015T, SS	Attaches centerplane PCB
Figure 12-16	1560-0046	Washer, Flat, #6, 0.156ID, 0.375OD, 0.049T, St, Zn	
Figure 12-5 Figure 12-29 Figure 12-30 Figure 12-48 Figure 12-62	1560-0061	Washer, Flat, #6, 0.312OD, 0.32T, St, Zn	

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-6 Figure 12-19 Figure 12-27 Figure 12-32 Figure 12-60 Figure 12-73 Figure 12-77 Figure 12-78 Figure 12-79 Figure 12-80 Figure 12-81 Figure 12-82	1560-0051	Washer, Flat, #10, 0.203Id, 0.500D, 0.04T, St, Zn	
Figure 12-51 Figure 12-52 Figure 12-87	1560-0020	Washer, Flat, 1/4, 0.6250D, 0.065T, St, Zn	
Figure 12-51 Figure 12-52 Figure 12-87	1561-0001	Washer, Internal Lock, 1/4, 0.4780D, 0.025T	
Figure 12-64 Figure 12-65	1561-0017	Washer, Internal Lock, 5/16, .610OD, .034T, St, Zn	Philips HDI 5000 system
Figure 12-31	1065-4502-01	Washer, Isolation, Speaker, Monitor	
Figure 12-65	1065-5888-01	Washer, Lower Shoulder	Philips HDI 5000 system

Table 12-1 HDI 5000/Philips 5000 System Parts List (Continued)

Located On	Part Number	Part Description	Notes/Reference
Figure 12-65	1065-5889-01	Washer, Lower Thrust	Philips HDI 5000 system
Figure 12-31	1562-0016-01	Washer, Shoulder, #6, 0.14ID, 0.17SD, 0.29OD, Ny	
Figure 12-64 Figure 12-65	1565-0082-01	Washer, Thrust, Selflube, 620D, 38Id	Philips HDI 5000 system
Figure 12-51	4100-1784-01	Wear Strip, Sliding Tray	Use with Detent Pin 1065-5408-02
Figure 12-10 Figure 12-11	1065-1972-XX	Weldment, Card Cage	
Figure 12-51	2950-0857-01	Wheel, Axle Assy	2 each side
Figure 12-52		Wheel, Caster Assy	2 each caster
Figure 12-43	3500-2739-01	Wrist Support, Self-Adhesive, Dark Gray	

Accessories Parts List

Table 12-2 HDI 5000 System Accessories Parts List (Not Illustrated)

Part Number	Part Description	Notes/Reference
8500-9116-01	Kit, Accessory Tool	Hitachi system
9905-0396-01	Screwdriver, #1 Phillips, 3-1/8-in Shaft	
9905-0397-01	Screwdriver, 7/64-in Ball Hex, 6-in Shaft	
9903-0517-01	Bag, Zipper, Ring Binder, 9.5 x 6-in	
8000-1257-02	Kit, Caster Assy, with Hubcap	
2100-1419-01	Kit, Cleaning, Optical Drive, Fujitsu	Use with drive 2100-1416-01
8000-1682-01	Kit, Dependency 1512 MO Drive with Bracket	Contains: 2100-1646-01, 1065-5058-01
8000-1969-01	Kit, Dependency, 1646 MO Drive with Bracket	
8000-2163-01	Kit, Dependency, IBM, 15.3-GB with Software Utility	
8000-2001-01	Kit, Dependency, IBM, Adapter, Clamp, Ops	
8000-1900-01	Kit, Dependency, IBM Assembly and Clamp	
8000-1906-02	Kit, Dependency, Monitor/Microphone	
8000-1671-02	Kit, Dependency, Rear Cover, 2 Swivel Casters	
8000-1462-01	Kit, New Dependency, Monitor Cover	Contains: 1065-4691-02,1065-4314-03, 1630-0090-01, 4600-0271-01
8000-1278-02	Kit, Plastic Rear Cover, 4 Swivel Casters	
8000-1668-01	Kit, UIF Cable Clamps	Alternate to 1065-4800-01
8000-2235-01	Kit, XCVR Support Bracket	

Table 12-2 HDI 5000 System Accessories Parts List (Not Illustrated) (Continued)

Part Number	Part Description	Notes/Reference
2100-0792-01	Optical Disk, 3.5-in 128-MB (blank)	
2301-0700-01	Paint, Touch Up, Fog White, 1 oz. Bottle	
2301-0701-01	Paint, Touch Up, Fog White, 16 oz. Aerosol	

Peripherals Parts List

Table 12-3 Peripherals and Applicable Cables (Not Illustrated)

	Part Numbers		
OEM Description	OEM	Power Cable	Signal Cable
Access Acquisition Module, 115V, NTSC, Internal Installation.	2100-7071-01	3500-1517-05	2275-0327-01 2275-0395-01
Access Acquisition Module, 115V, NTSC, External Installation.	2100-7071-01	3500-1517-05	2275-0394-01 2275-0396-01
Camera, Aspect MIC, 120V, NTSC, English	3500-1664-01	3500-1873-02	3500-1539-03
External OEM with coax connector (P/N is for BNC cable, 6 ft. length).	-	-	2275-0176
External OEM with coax connector (P/N is for I-RGB cable).	-	-	3500-2644-01
External OEM with coax connector (P/N is for NI-RGB cable).	-	-	2275-0326-01

Table 12-3 Peripherals and Applicable Cables (Not Illustrated) (Continued)

OEM Description	Part Numbers OEM	Power Cable	Signal Cable
Monitor, Video (power cable is 115V with right angle connector on monitor end)	3500-2532-XX	3500-2616-01	2275-0325-03
Printer, B&W, Mitsubishi P91, 120/230V, NTSC/PAL (use either power cable)	2100-1680-01	3500-1873-02 3500-2397-03	3500-1540-04
Printer, B&W, Sony UP890, 120/230V, NTSC/PAL (use either power cable)	2100-0862-01	3500-1873-02 3500-2397-03	3500-1540-04
Printer, B&W, Sony UP895MD, 120/230V, NTSC/PAL (use either power cable)	2100-1855-01	3500-1873-02 3500-2397-03	3500-1540-04
Printer, B&W, Sony UP910MD, 120V, NTSC	2100-0701-01	3500-1873-02	3500-1540-04
Printer, Codonics NP1660MD, NetLink, North America	2100-1566-01	-	2275-0335-01
Printer, Codonics NP1660MD, NetLink, International	2100-1567-01	-	2275-0335-01
Printer, Color, Mitsubishi, CP700, 120V (3500-3071-01 is printer with feet)	3500-3071-01 2100-1327-01	3500-1873-02	3500-2641-02
Printer, Color, Mitsubishi, CP800, 120V (3500-3063-01 is printer with feet)	3500-3063-01 2100-1535-01	3500-1873-02	3500-2641-02
Printer, Color, Sony UP-21MD NTSC/PAL	2100-1852-01	3500-1873-02	3500-2641-02
Printer, Color, Sony UP5600-60-Hz, 155Vac, NTSC	2100-0847-01	3500-1873-02	3500-2641-02

Table 12-3 Peripherals and Applicable Cables (Not Illustrated) (Continued)

OEM Description	Part Numbers OEM	Power Cable	Signal Cable
Printer, Color, Sony UP5600-60-Hz, 120Vac, NTSC (Domestic US use only)	2100-1476-01	3500-1873-02	3500-2641-02
VCR, w/RS232 Interface, AGMD830P, 120V, Figure 12-34	3500-1662-02	3500-2780-01	3500-1404-06
VCR, Assy, W/RS232, AGMD835P, 120V	3500-3234-01	3500-2780-01	3500-1404-06
VCR, Sony SVO-9500MD	3500-1875-01	3500-2780-01	3500-1404-06

13 Scanheads

Scanheads

Table 13-1contains the scanhead name that appears on the system monitor, the scanhead label, the scanhead frequency, and the Doppler frequency of system scanheads.

Table 13-2 contains a summary of scanhead types, capabilities, and advantages. In addition to the scanheads listed in the table, the system is also capable of using the Endo 12-5 Endoscopic Scanhead manufactured by Olympus. This scanhead is not sold by Philips and does not have a part number.

Scanhead Matrix

Not all scanhead types may be supported by a specific system software level.

- Order scanheads by scanhead type or name and part number and current dash level.
- Backward compatible (Bkwd Comp.) indicates the previous versions which the latest dash level replaces.

Scanhead Biopsy Guides

Scanhead biopsy guides can no longer be purchased from Philips Ultrasound. Supplies and accessories are now available from CIVCO Medical Instruments. Refer to “Supplies and Accessories” on page 35 for information.

Table 13-1 Scanhead Information

Scanhead Name	No. Elem.	Scanhead Label	Operating Frequency	Doppler Frequency
L7-4 38 mm	128	Linear Array L7-4	7.0 - 4.0 MHz	4.0 MHz
LI9-5	128	Linear Array LI9-5	9.0 - 5.0 MHz	5.0 MHz
LAP L9-5	128	Linear Array L9-5	9.0 - 5.0 MHz	6.0 MHz
L10-5 38 mm	192	Linear Array L10-5	10.0 - 5.0 MHz	6.0 MHz
L12-5 38 mm	192	Linear Array L12-5	12.0 - 5.0 MHz	6.0 MHz
L12-5 50 mm	256	Linear Array L12-5	12.0 - 5.0 MHz	6.0 MHz
CL10-5	128	Compact Linear Array CL10-5	10.0 - 5.0 MHz	6.0 MHz
CL15-7	128	Broadband Linear Array CL15-7	15.0 - 7.0 MHz	6.0 MHz
C4-2 40 mm	128	Curved Array C4-2	4.0 - 2.0 MHz	2.5 MHz
C5-2 40 mm	128	Curved Array C5-2	5.0 - 2.0 MHz	2.5 MHz
C7-4 40 mm	128	Curved Array C7-4	7.0 - 4.0 MHz	4.0 MHz
CT8-4 40 mm	128	Curved Array CT8-4	8.0 - 4.0 MHz	6.0 MHz
C8-4v 11 mm	128	Curved Array C8-4v	8.0 - 4.0 MHz	5.0 MHz
C8-5	128	Curved Array C8-5	8.0 - 5.0 MHz	5.0 MHz
C9-5 ICT 8 mm	128	Curved Array C9-5	9.0 - 5.0 MHz	5.0 MHz
P3-2 20 mm	64	Phased Array P3-2	3.25 - 1.75 MHz	2.0 MHz
P4-1 20 mm	128	Phased Array P4-1	4.0 - 1.0 MHz	2.0 MHz
P4-2 20 mm	64	Phased Array P4-2	4.0 - 2.0 MHz	2.0 MHz
P5-3 16 mm	64	Phased Array P5-3	5.0 - 3.0 MHz	3.0 MHz
P6-3 28 mm	128	Phased Array P6-3	6.0 - 3.0 MHz	3.0 MHz

Table 13-1 Scanhead Information (Continued)

Scanhead Name	No. Elem.	Scanhead Label	Operating Frequency	Doppler Frequency
P7-4 16 mm	64	Phased Array P7-4	7.0 - 4.0 MHz	4.0 MHz
MPT7-4 10 mm	64	Phased Array MPT7-4	7.0 - 4.0 MHz	4.0 MHz
BPT9-5	2x64	Phased Array BPT9-5	9.0 - 5.0 MHz	6.0 MHz
BPTRT9-5	2x128	Broadband Dual Array	9.0 - 5.0 MHz[1]	6.0 MHz[1]
TCD Static	1	D2 TC		2.0 MHz
D2 Static	2	D2 CW		2.0 MHz
D5 Static	2	D5 CW		5.0 MHz
D10 Static	2	D10 CW		10.0 MHz

1. The operating frequency and the Doppler frequency are the same for the curved and linear arrays for this scanhead.

Table 13-2 Scanhead Types, Capabilities, and Advantages

Type	Capabilities	Advantages
Linear Array		
- L7-4 40 mm - LI9-5 33 mm - LAP L9-5 - L10-5 38 mm - L12-5 38 mm - L12-5 50 mm - CL10-5 - CL15-7 - BPTRT9-5	- 2D, M-mode, pulsed Doppler, Power, and Color	- Dynamic receive focus for optimal lateral resolution - Multiple transmit focal zones - Wide field of view - High frame rate - Excellent tissue definition and contrast resolution - Excellent small parts imaging
Curved Array		
- C4-2 40R - C5-2 40R - C7-4 40 mm - C8-4v - CT8-4 - C8-5 - C9-5 8 mm - BPTRT9-5	- 2D, M-mode, pulsed Doppler, Power, and Color	- Combines the advantages of phased array and linear array scanheads - Multiple transmit focal zones - Sector format with wide field of view at skin surface - Aperture size consistent across sector results in good lateral resolution - Dynamic receive focus - Excellent resolution and detail - Design is lightweight and easy to use - C5-2 has Contrast Specific Imaging capability

Table 13-2 Scanhead Types, Capabilities, and Advantages (Continued)

Type	Capabilities	Advantages
Phased Array		
- P3-2 20 mm - P4-2 20 mm -) P4-1 20 mm - P5-3 16 mm - P6-3 28 mm - P7-4 16 mm - MPT7-4 10 mm - BPT9-5	- 2D, M-mode, pulsed Doppler, CW Doppler (except P6-3), Power, Color, and Color M-mode	- Multiple transmit focal zones - Dynamic receive focus - MPT7-4 for transesophageal applications - P3-2, P4-2, and P5-3 have Contrast Specific Imaging capability
Pencil Probes		
- D2 CW - D5 CW - D10 CW	- CW Doppler	- Good continuous-wave Doppler sensitivity
- D2 TC	- Pulsed Doppler	- Good pulsed Doppler sensitivity

Table 13-3 Scanhead Software Compatibility Matrix

Scanhead	Part Number	Dash Number: Current	Dash Number: Bkwd Comp.[1]	Dash Number: EMC[3]	No. Elem.	Hardware Notes	S/W Comp.[2]
PHASED ARRAY							
P3-2 20 mm	4000-0287	04	03	04	64		107.10
P4-1 20 mm	4000-0900	01	-	01	128	Supports biopsy guide[4]	198.06
P4-2 20 mm	4000-0660	02	-	02	64	Supports biopsy guide[4]	124.13
P5-3 16 mm	4000-0316	05	-	05,04	64	Supports biopsy guide[4]	107.10
P6-3 mm	4000-0647	02	01	02	128	Supports biopsy guide[4]	107.10
P7-4 8 mm	4000-0322	02	-	02	64	Supports biopsy guide[4]	107.10
MPT7-4	4000-0317	17	16, 11, 10	16, 11	64	-16 supports 3D on 170.30	107.10
BPT9-5	4000-0420	01	-	01	2x64	Supports biopsy guide[4]	170.30
BROADBAND LINEAR ARRAY							
L7-4	4000-0318	09,08	05	05	128	Supports biopsy guide[4]	107.10
LAP L9-5	4000-0658	04	-		128		127.04
LI9-5	4000-0408	01	-		128		127.04
L10-5 38 mm	4000-0263	06	-		192	Supports biopsy guide[4]	170.30
L12-5 38 mm	4000-0396	05	04	02[5]	192	Supports biopsy guide[4]	107.10

Table 13-3 Scanhead Software Compatibility Matrix (Continued)

Scanhead	Part Number	Dash Number: Current	Dash Number: Bkwd Comp.[1]	Dash Number: EMC[3]	No. Elem.	Hardware Notes	S/W Comp.[2]
L12-5 50 mm	4000-0762	03	02	01	256	Supports biopsy guide[4]	127.04
CL10-5	4000-0315	06	05	05,04	128		108.15
CL15-7	4000-0765	02	-	-	128		190.13
BPTRT9-5	4000-0903	01	-	01	2x128	Has curved and linear arrays Supports biopsy guide[4]	195.25
CURVED ARRAY							
C4-2	4000-0320	07	05, 03	03-06	128	Supports biopsy guide[4]	108.15
C5-2 40R	4000-0574	03	02, 01	01	128	Supports biopsy guide[4]	107.10
C7-4 40R	4000-0301	07, 06	06	04-06	128	Supports biopsy guide[4]	107.10
C8-4v 11mm	4000-0409	02	-	02	128	Supports biopsy guide[4]	107.10
CT8-4 40 mm	4000-0390	04, 03	03	-	128	Supports biopsy guide[4]	127.04
C8-5 14R	4000-0676	05	04	03,02	128	Supports biopsy guide[4]	107.10
C8-5 14R	4000-0820	01	-		128	Supports biopsy guide[4]	127.09
C9-5 ICT	4000-0280	14, 15, 16	10	14,15,16	128	Supports biopsy guide[4]	107.10
BPTRT9-5	4000-0903	01	-	01	2x128	Has curved and linear arrays	195.25

Table 13-3 Scanhead Software Compatibility Matrix (Continued)

Scanhead	Part Number	Dash Number: Current	Dash Number: Bkwd Comp.[1]	Dash Number: EMC[3]	No. Elem.	Hardware Notes	S/W Comp.[2]
STATIC CW							
D2 TC	4000-0310	02	-	02	1		107.10
D2 CW	4000-0307	05	04	03	2		107.10
D5 CW	4000-0308	02	-	02	2		107.10
D10 CW	4000-0309	02	-	02	2		107.10

1. The "Bkwd Comp." column lists dash numbers that are backward compatible with the listed scanhead.
2. The "S/W Comp." column lists the minimum software build level required for use of the listed scanhead.
3. The "EMC" column lists dash numbers of scanheads which may be ordered worldwide (must use EMC scanheads for Europe). Non-EMC scanheads may be ordered for domestic U.S. and other countries.
4. Refer to "Supplies and Accessories" on page 35.
5. Scanhead part number 4000-0396-01 should not be used.

14 Glossary

Abbreviations

$4V^2$	Peak Pressure Gradient
A	Amps
A1B	A1B - A13B and PS1 - PS4 identify card cage slot positions
AC	Alternating Current
ACIM	AC Input Module (main power input panel)
A/D	Analog-to-Digital Conversion
ADAPTR	Advanced Digital, Audio, Physio and Translator (module)
AIFOM	Advanced IF Output Module
AIM+	Analog Interface Module Plus
Al	Aluminum
AP&I	Acoustical Power and Intensity
AQ	Acquisition (bus)
AQ Bus	Acquisition Bus
Assy	Assembly
AT	Acceleration Time; Averaging Time
Blk	Black
CB, Ch Bd	Channel Board
CFM	Cubic Feet per Minute
Conn	Connector
CPI	Control Panel Interface (module)
CPU	System CPU (system controller module)
D	Diameter

DAC	Digital-to-Analog Converter
D/A	Digital-to-Analog Conversion
DC	Direct Current
DDEA	Disc Drive, ECG and Audio (module)
DHHS	Department of Health and Human Services (U.S.)
DT	Deceleration Time
ECG	Electrocardiograph
ESP	Extended Signal Processing
Fl / Flh	Flat / Flathead
FEC	Front End Controller (module)
FOOTSW	Footswitch
F/W	Firmware
GB	Gigabyte
H	High
Hd	Hex drive
Hosp	Hospital
HR	Heart Rate
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
H/W	Hardware
Hz	Hertz
ID	Inside diameter (screws or hardware); or system identification number
IF	Intermediate Frequency
IIM	Internal Interface Module
IMEM	Image Memory (module)
Ins	Inside

Int	Internal
ISEM	Integrated Stress Echo Module
L	Long
lb	Pound
lb/min	Pounds per minute
LCP	Lower Control Panel (module)
Lk	Lock
LED	Light Emitting Diode
LEP	List of Effective Pages
LUT	Look-Up Table
Max	Maximum
MB	Megabyte
MDF / EDF	Minimum / End Diastolic Velocity and Frequency
MO	Magneto-Optical (drive); or Machine Option (files)
MON	Monitor
Mt	Mounting
Mux	Multiplexer
NTSC	National Television Standard Committee (video standard)
Ny	Nylon
OD	Outside diameter
OEM	Original Equipment Manufacture: peripheral device such as a printer, VCR, or camera
Oz	Ounces
PAL	Phased Alteration by Line (European video standard)
PCM	Pixel Conversion Module
PD / Pd	Processed Data (bus); Phillips drive (screw)

PI	Pulsatility Index
PIM	Peripheral Interface Module
PLL	Phase Loop Locking
Pnh	Panhead
Pnl	Panel
Plystr	Polyester
PS1	A1B - A13B and PS1 - PS4 identify card cage slot positions
PSM	Power Supply Module
PSP1, PSP2	Pixel Space Processor (module)
PSV/PSF	Peak Systolic Velocity and Frequency
RF	Radio Frequency
RFI	Radio Frequency Interference
RI	Resistive Index
Rkr	Rocker (Switch)
Rx	Receive, Receiver
SBY	Standby
SCSI	Small Computer Serial Interface
S/D	Systolic/Diastolic Ratio
S/H	Scanhead
Shld	Shield or shielded
S/HSEL	Scanhead Select (module)
Skh	Socket head
SPM	Signal Processing Module
Spst	Single pole, single throw (switch)
Ss	Stainless Steel
St	Steel

S-VHS	Super VHS: a VCR video format
Sw	Switch
S/W	Software
T	Thick
TAF	Time-Averaged Frequency
TAM	Time-Averaged Mean Velocity
TAP	Time-Averaged Peak Velocity
TGC	Time Gain Compensation
TOC	Table of Contents
TTag	Time Tag (bus)
Tx	Transmit, Transmitter
UCP	Upper Control Panel (module)
UIF	User Interface (LCP, UCP and CPI)
UIM	User Interface Module
Unshld	Unshielded
VA	Volt amps
Vac	Volts AC
Vdc	Volts DC
VTI	Velocity-Time Integral
W	Wide (refers to a distance measurement); or Watt (unit of electrical power)
w	with
Wht	White
w/o	without
Xfmr	Transformer
Zn	Zinc

Terms

Artifact	An undesirable imaging anomaly created as the result of acoustic effects or system processing.
Box	An image made up of a sequential set of columns that is usually smaller than the sector size would allow. Most commonly refers to the color-flow image-color box.
Burst	The transmitted waveform.
Drain	Usually a wire included in a coaxial or shielded cable that is in contact with the shield's braid or foil for the length of the cable. It is used to make the mechanical attachment and consequently the electrical path from the shield to the connector or plug.
FFT	Fast Fourier transformation; a mathematical method used with Doppler shift data to calculate the frequency spectrum, which results in the Doppler display.
Interlaced	Video format where two fields make up one 30 Hz frame. Video rows (scan lines) of the raster are interlaced, that is, field one provides rows 1, 3, 5, then field two fills in rows 2, 4, 6, and so on. See "non-interlaced".
MOP	Module Operations Processor; A board-level microprocessor dedicated to carrying out the functions of its hardware module. Communicates with the system CPU via a SCIP bus. Typically runs tasks such as initialization of registers, self-test, interpreting commands from the System CPU, and orchestrating real-time tasks on the hardware module.

Noise band	Any level of random background noise when the system speaker (not headphone) volume is set for a typical user setting (generally just above a mid-range setting). Also, any regular line or trace that clearly appears in the scrolling display (as three pixels/inch or more) at a level that is greater than the background noise.
Non-interlaced	Video format where the video rows are processed in sequence (1, 2, 3, 4, 5, 6, . . .) and updated at a 60 Hz rate. See “interlaced”.
NTSC	National Television Standards Committee – 525-line, 60Hz, composite video, usually color.
OEM	Original Equipment Manufacturer; A peripheral device (VCR, printer, camera)
PAL	Phased Alteration by Line; 625-line, 50-Hz composite video, usually color.
PRI	Pulse repetition interval; the time between ultrasound pulses. This time determines how much processing can take place and still keep up with the data acquisition.
PRF	Pulse Repetition Frequency; rate at which ultrasound pulses are sent into the tissue. Based primarily on depth desired, but also depends on other variables such as dead time.
SCIP, SC	System Control Interface Processor; a set of processors that reside on all modules that communicate with the CPU PCB. SCIP refers to the communication system which includes protocol, firmware, and hardware.

UART Port	Universal Asynchronous Receiver Transmitter; a serial communication port located on the card edge of the FEC. Also called Debug Port or Diagnostic Port.
Watchdog	A level detector, a comparator circuit, or a time-out circuit, which ensures the proper functioning of a supply, a regulator, or other circuitry, and disables the monitored circuit if it is out of specification or the timer is not reset.